THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LVIII. No. 1470.] LONDON, JULY 14, 1891. [43RD YEAR. Price 6d.

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Special Quotations to Gas Companies.
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Makers of the most perfect form of Apparatus for the Manufacture of Sulphate, Muriate, Liquid Ammonia, and Tar Products.

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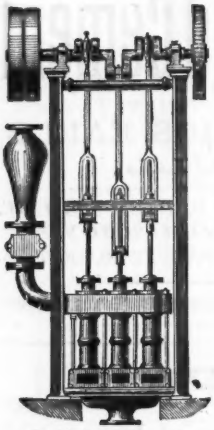

Treble-Barrel Pumps in Frame.

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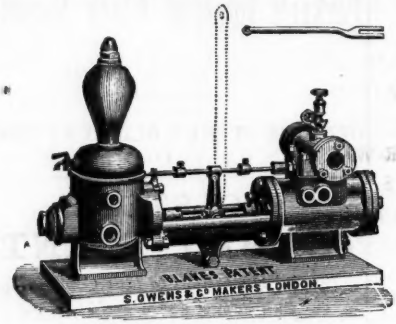

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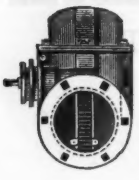

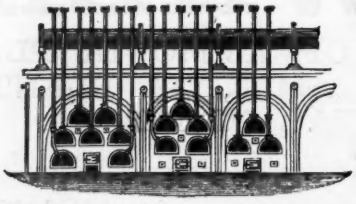

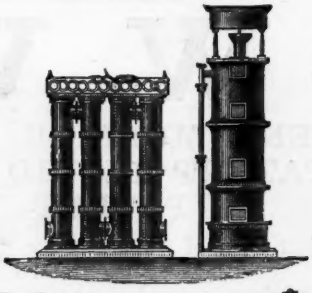

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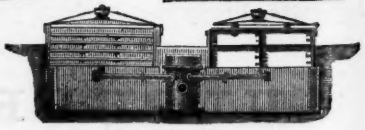

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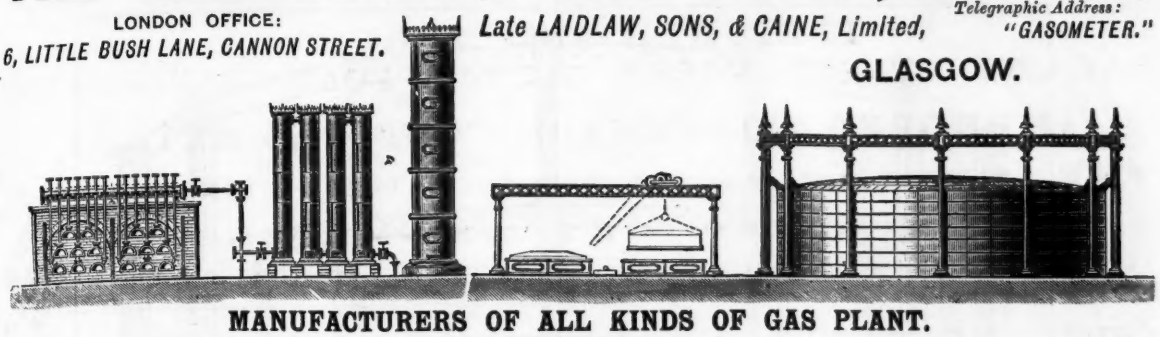

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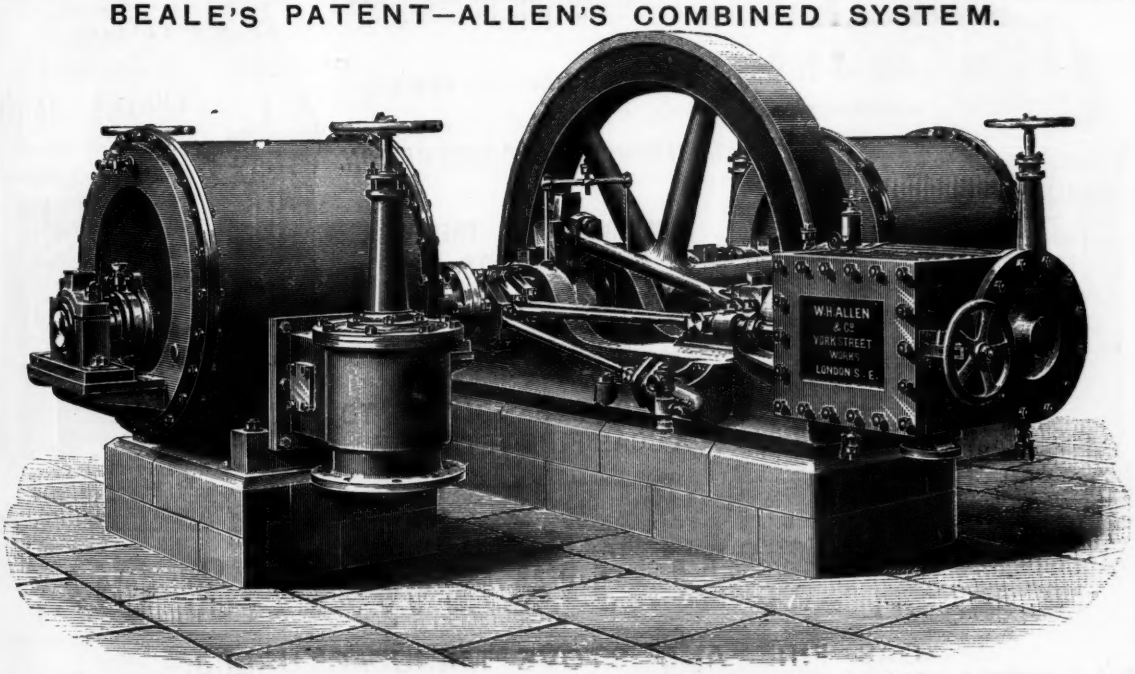

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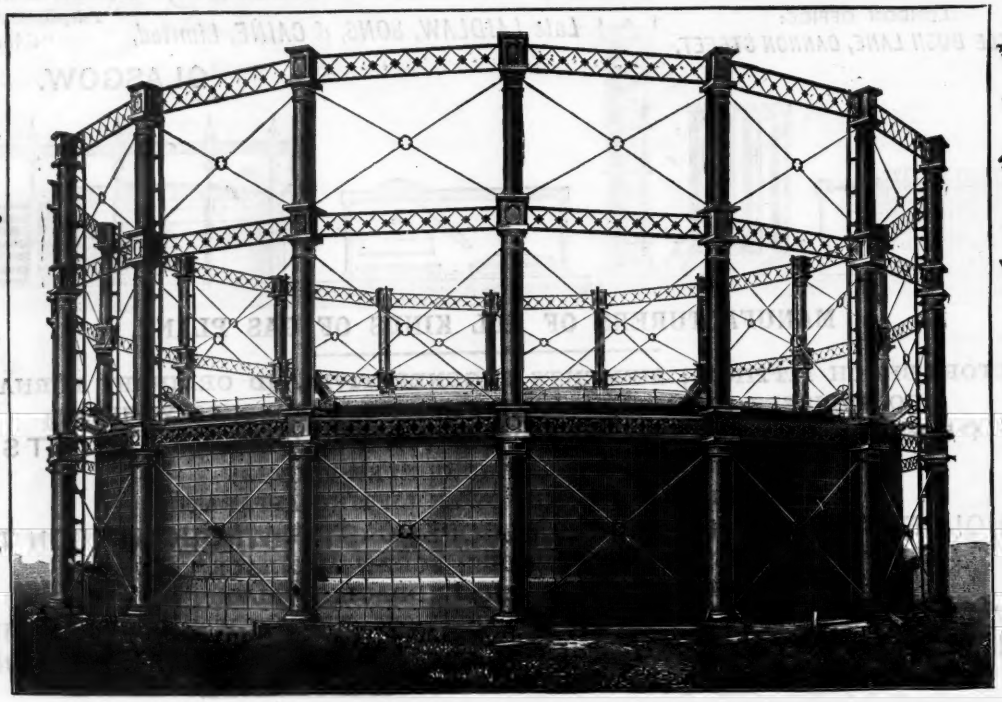

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SURPASSING ALL PREVIOUS ATTAINMENTS.

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SIZES—15in. WIDE, 6½in. DEEP, 20in. HIGH.
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RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

ESTABLISHED MORE THAN A QUARTER OF A CENTURY.

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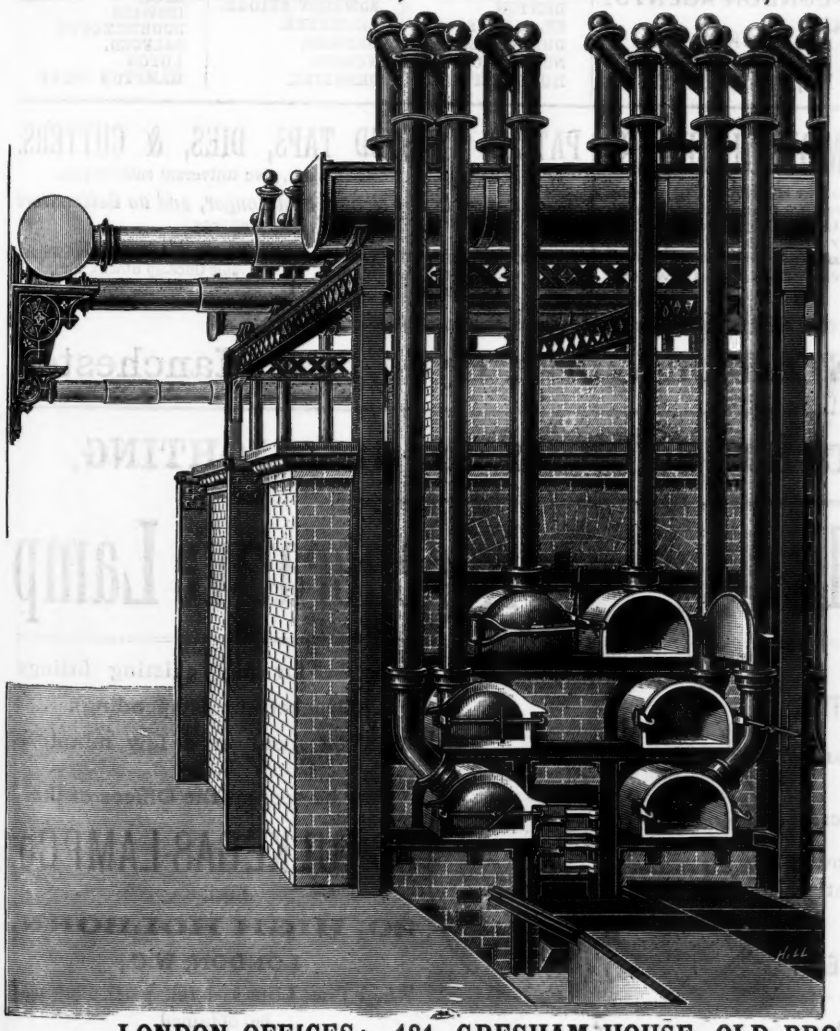

RETORT-BENCH

SHOWING APPLICATION OF

MESSRS. R. & J. DEMPSTER'S

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Regenerative Furnace

TO A

BED OF SIX RETORTS.

These Furnaces are very economical in the consumption of Fuel and in the wear and tear of Retorts, and require a minimum of Excavation.

Retort-Benches erected complete, with or without Regenerative Furnaces, and with Brick, Clay, or Iron Retorts.

Mouthpieces with self-sealing Lids.

Stamped Retort-Lids, in Iron or Steel.

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Patent Wrought-Iron Ascension-Pipes.

Furnace Frames and Arch-Pipes in great variety.

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A STOCK OF DIFFERENT SHAPES ON HAND.

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By Her Majesty's Royal Letters Patent.

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The most successful and approved Apparatus known up to the present time.

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PATENT TWISTED TAPS, DIES, & CUTTERS.

Thousands in constant work, give universal satisfaction.

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Main Drilling Stand, with Cup Drills, 1¼ to 6 inch; Taps, Rymers, and Drills.

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The Schülke Regenerative Lamp

FOR

DOMESTIC AND EXTERNAL LIGHTING.

The only Regenerative Lamp employing the Common Flat-Flame Burners.

Lamps giving 20-Candle power consume less than four feet of Gas per hour.

PURE WHITE & PERFECTLY STEADY LIGHT,

NOT AFFECTED BY DRAUGHTS.

Suitable for any existing fittings (Brackets or Suspending).

Can be fixed in a few minutes.

May be seen at the Offices of the

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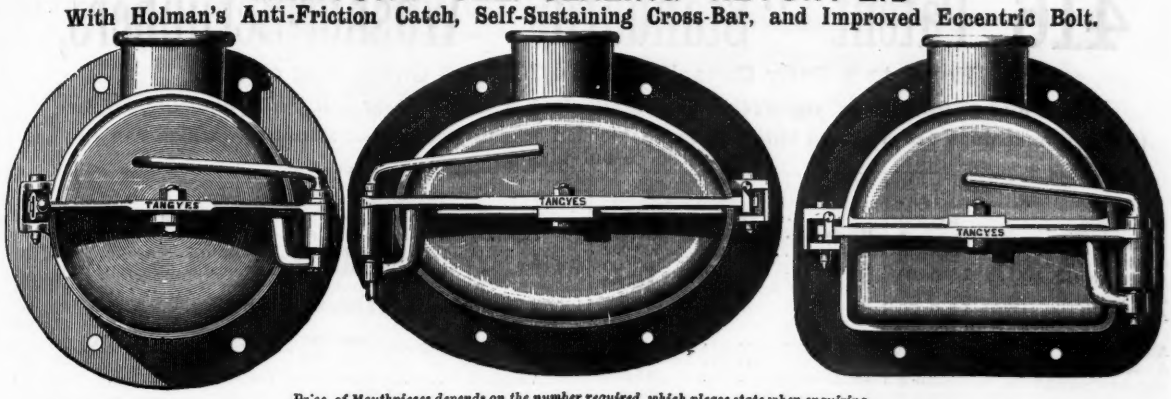
MORTON'S SELF-SEALING RETORT-LID

With Holman's Anti-Friction Catch, Self-Sustaining Cross-Bar, and Improved Eccentric Bolt.



Price of Mouthpieces depends on the number required, which please state when enquiring.

These Retort Lids and Fastenings are in extensive use in most of the Gas-Works in Great Britain, America, and on the Continent, and have almost entirely displaced the older method of sealing by a luting of lime or other material. The Lids are made in three forms, round, oval, and D (as shown above), in each of which we have a very extensive variety of patterns, from which Gas Engineers contemplating the adoption of these lids are recommended to make their selection, in order to avoid cost of pattern making, delays, &c., &c.

Mouthpieces with Circular Lids for Round Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
3494	14 ins.	14 ins.	12½ ins.	£0 19 0
2982	15 „	15 „	14 „	1 0 0
3453	15 „	15 „	12½ „	1 0 0
3497	15 „	15 „	15 „	1 0 0
3630	16 „	16 „	10½ or 11⅝ „	1 1 0
4549	16 „	16 „	15½ „	1 1 0
6262	16 „	16 „	13½ „	1 1 0
6396	16 „	16 „	15 „	1 1 0
7668	16 „	16 „	17⅞ „	1 1 0
10289	16 „	16 „	11 „	1 1 0
3356	17 „	17 „	15 „	1 3 0
7125	17 „	17 „	6 „	1 3 0
933	18 „	18 „	11⅝ „	1 5 0
4045	18 „	18 „	14 „	1 5 0
6397	18 „	18 „	15 „	1 5 0
8013	18 „	18 „	15 „	1 5 0

Taper Circular Mouthpieces with Circular Lids for Round Retorts.

	Front. Back.			
13001	15 to 21 ins.	21 ins. diam.	13½ ins.	£1 0 0
13261	15 „ 24 „	15 „	13⅜ „	1 0 0
12995	15 „ 30 „	30 „	13 „	1 0 0
9562	18 „ 21 „	21 „	12½ „	1 5 0
10425	18 „ 21 „	21 „	4½ „	1 5 0
13418	18 „ 22 „	22 „	12 „	1 5 0
13396	20 „ 20⅝ „	20⅝ „	4 „	1 11 0

Mouthpieces with Circular Lids for D Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
5348	14 ins.	14 × 13 ins.	7 ins.	£0 19 0
14209	14 „	14 „ 13 „	13½ „	0 19 0
14231	14 „	12⅝ „ 12⅝ „	10 „	0 19 0
3463	15 „	15 „ 13 „	14 „	1 0 0
6678	15 „	15 „ 14 „	12 „	1 0 0
3661	15½ „	15½ „ 13 „	12 „	1 1 0
13052	16 „	16 „ 13 „	18 „	1 1 0
5601	16 „	16 „ 14 „	15 „	1 1 0
6827	16 „	16 „ 14 „	17 „	1 1 0
4494	16 „	16 „ 14 „	14 „	1 1 0
3548	16 „	16 „ 15 „	12½ „	1 1 0
6677	16 „	16½ „ 13½ „	12½ „	1 1 0
9645	16 „	16½ „ 13¾ „	12½ „	1 1 0
4434	16 „	17⅝ „ 14 „	14 „	1 1 0
6469	16 „	18 „ 14 „	15 „	1 1 0
9015	16 „	18 „ 14 „	18½ „	1 1 0
4327	16 „	18 „ 15 „	15½ or 19 „	1 1 0
8049A	16 „	18 „ 15 „	17⅞ „	1 1 0
6137	16 „	20½ „ 13¾ „	18½ „	1 1 0
5918	17 „	18 „ 14 „	14 or 17 „	1 3 0
5053	17 „	19⅝ „ 12 „	14½ „	1 3 0
7548	17 „	20 „ 13 „	15 „	1 3 0
6468	17 „	20 „ 16 „	15½ „	1 3 0
4316B	17 „	21 „ 14 „	14 „	1 3 0
7975	17 „	21 „ 15 „	14½ „	1 3 0
13459	17 „	21½ „ 13½ „	15 „	1 3 0
14284	18 „	18 „ 13½ „	19 „	1 5 0
12990	18 „	18 „ 15 „	15 or 19 „	1 5 0
7135	18 „	18¾ „ 15 „	13 „	1 5 0
10221	18 „	18 „ 16 „	12⅝ „	1 5 0
4506	18 „	20 „ 13 „	19½ „	1 5 0
6470	18 „	20 „ 13 „	15 „	1 5 0
6818	18 „	20 „ 13¼ „	17½ „	1 5 0
13998	18 „	20 „ 14 „	19½ „	1 5 0
4083	18 „	20 „ 15 „	16 „	1 5 0
5306	18 „	20½ „ 14 „	13½ „	1 5 0
13295	18 „	20½ „ 14 „	19½ „	1 5 0
7356	18 „	20½ „ 13½ „	13 „	1 5 0
4569	18 „	21 „ 14 „	18 „	1 5 0
3628	18 „	21 „ 15 „	16 „	1 5 0
13999	18 „	22 „ 14 „	19½ „	1 5 0
7640	18 „	22 „ 12½ „	18½ „	1 5 0
14250	19 „	19 „ 14 „	19 „	1 8 6
14286	19 „	20 „ 13½ „	20 „	1 8 6
7971A	20 „	20 „ 15 „	18 „	1 11 0
14285	20 „	21 „ 13½ „	19 „	1 11 0

Mouthpieces with Circular Lids for Oval Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
13658	14 ins.	14 × 12 ins.	15 ins.	£0 19 0
4356	14 „	18½ „ 12 „	12½ „	0 19 0
6851	15 „	16 „ 14 „	18 „	1 0 0
3629	15 „	18½ „ 13½ „	14 „	1 0 0
3580	15 „	21 „ 15 „	15 „	1 0 0
6264	16 „	18½ „ 15½ „	15½ „	1 1 0
5210	16 „	20 „ 14 „	15 „	1 1 0
6263	16 „	24 „ 16 „	13½ „	1 1 0
5370	17 „	20 „ 14 „	14 „	1 3 0
6832	17 „	20 „ 14 „	17 „	1 3 0
6183	17 „	20 „ 15 „	15 „	1 3 0
4289	17 „	21 „ 15 „	14 „	1 3 0
5270	17 „	22 „ 14 „	14 „	1 3 0
3631	18 „	18 „ 14 „	20 „	1 5 0
3681	18 „	21 „ 14 „	13½ or 15 „	1 5 0
3554	18 „	21 „ 15 „	14½ „	1 5 0
7957	18 „	22 „ 16 „	14 „	1 5 0
8048A	19 „	25⅜ „ 15 „	18 „	1 8 6

Mouthpieces with Oval Lids for Oval Retorts.

Pattern No.	Dimensions of Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
9800	18 × 14⅞ ins.	18 × 14⅞ ins.	15 ins.	£1 5 0
9205	20 „ 13 „	24 „ 14 „	10½ „	1 10 0
10000	20½ „ 14½ „	20½ „ 14½ „	16 „	1 10 0
9680	21 „ 15 „	21 „ 15 „	15 „	1 12 0
10056	21 „ 14½ „	21 „ 14½ „	15⅝ „	1 12 0
13218	21 „ 15 „	21 „ 15 „	17 „	1 12 0
10514	22½ „ 13⅝ „	22½ „ 13⅝ „	18⅝ „	1 13 0
13766	20 „ 17 „	20 „ 17 „	15⅛ „	1 15 0
13269	24 „ 15 „	24 „ 15 „	16 „	1 18 0
13884	24 „ 15 „	24 „ 15 „	10 „	1 18 0

Mouthpieces with D Lids for D Retorts.

Pattern No.	Dimensions of Mouth.	Internal Dimension of Retort.	Length of Mouthpiece.	Lid and Fittings without Mouthpiece.
12292	15½ × 13 ins.	15½ × 13 ins.	12 ins.	£1 2 0
9967	16 „ 14 „	16 „ 14 „	15½ „	1 3 0
13574	16⅜ „ 13⅜ „	16⅜ „ 13⅜ „	12½ „	1 4 0
9899	18 „ 12 „	18 „ 12 „	14 „	1 4 0
12980	16 „ 16 „	16 „ 16 „	18 „	1 6 0
13900	18 „ 13⅜ „	18 „ 13 „	15 „	1 6 0
9912	18 „ 13½ „	18 „ 13½ „	17 „	1 6 0
9962	18 „ 13½ „	18 „ 13½ „	16 „	1 6 0
10982	18 „ 13½ „	18 „ 14 „	15 „	1 6 0
11098	18 „ 14 „	18 „ 14 „	12 „	1 6 0
9492	20 „ 13 „	20 „ 13 „	15 „	1 10 0
9208	20 „ 13 „	20 „ 13 „	19½ „	1 10 0
10251	20 „ 13 „	20 „ 13 „	15½ „	1 10 0
12964	20 „ 13 „	20 „ 13 „	13½ „	1 10 0
9909	20 „ 13⅜ „	20 „ 13⅜ „	17 „	1 10 0
12969	19½ „ 15½ „	19½ „ 15½ „	14 „	1 11 0
13781	20 „ 15 „ Front. / 21 „ 15 „ Back.	21 „ 15 „	15 „	1 11 0
14287	20½ „ 14⅞ „	20½ „ 4⅞ „	17 „	1 11 0
7692	21 „ 15½ „	21 „ 15½ „	16 „	1 11 0
12978	20 „ 16 „	20 „ 16 „	17 „	1 11 0
13252	20 „ 16 „	20 „ 16 „	18 „	1 11 0
13220	21 „ 15 „	21 „ 15 „	17 „	1 11 0
13992	21 „ 16 „	21 „ 16 „	17 „	1 11 0
8977	21½ „ 13⅜ „	21½ „ 13⅜ „	18⅜ „	1 12 0
8976	21½ „ 13⅜ „	21½ „ 13⅜ „	18⅜ „	1 12 0
10497	21½ „ 13⅜ „	21 „ 13⅜ „	18⅜ „	1 12 0
8037	21½ „ 13⅜ „	21½ „ 13⅜ „	18⅜ „	1 12 0
9908	21½ „ 13½ „	21½ „ 13½ „	15 „	1 12 0
10404	21½ „ 13⅜ „	22 „ 14 „	18⅜ „	1 12 0
12410	21½ „ 13⅜ „	23 „ 14 „	12 „	1 12 0
13822	21½ „ 13⅜ „	23 „ 14 „	15 „	1 12 0
10515	22½ „ 12⅜ „	22½ „ 12⅜ „	13½ „	1 12 0
7924	24 „ 14 „	24 „ 14 „	15⅜ „	1 13 0
13807	24 „ 15½ „	24 „ 15½ „	16 „	1 14 0
9015B	25 „ 14 „	25 „ 14 „	12½ „	1 14 0
10932	25 „ 14 „	24 „ 14 „	13½ „	1 15 0
12944B	22 „ 16 „	22 „ 16 „	16 „	1 15 0
14037	22 „ 16 „	2 „ 16 „	16 „	1 15 0
14119	22 „ 16 „	22 „ 16 „	18 „	1 15 0

Patterns marked A have Sockets at back to connect to Retorts; all the others are flanged. Patterns marked B have curved bottoms.

Telegrams: "TANGYES BIRMINGHAM."

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KIRKHAM, HULETT, & CHANDLER, LIMITED.

Mr. SIDNEY HERSEY, Managing Director.] ADDRESS AT FOOT. [Mr. J. CHANDLER, Engineer.]

416 Patent "Standard" Washer-Scrubbers,

Equal to a Daily Capacity of 374,700,000 Cubic Feet of Gas,

Erected and in course of construction at present date, amongst them being the following, viz.:—

(All new machines are supplied with improved wooden washing devices—"Bundles"—which can also be fitted to old Washers)

	Capacity. Cubic feet per day.
Altrincham	600,000
Adelaide	600,000
Aldershot	200,000
Allegheny, U.S.A.	1,000,000
Ashton-under-Lyne	1,250,000
Amsterdam	1,500,000
"	1,500,000
Annaberg	200,000
Arcachon	100,000
Animal Charcoal Co.	200,000
Altoona, U.S.A.	350,000
Buxton	250,000
Bradford	1,000,000
"	1,250,000
"	1,250,000
"	1,250,000
"	1,000,000
"	1,000,000
"	3,000,000
Bremen	150,000
Baltimore, U.S.A.	1,000,000
"	1,000,000
"	1,000,000
Balmain, N.S.W.	125,000
Bishops Stortford	150,000
Blackpool	400,000
Brussels	1,250,000
"	1,250,000
"	750,000
"	1,250,000
Banbury	250,000
Birmingham	5,000,000
Birkenhead	2,500,000
Blackburn	1,500,000
Bochum	600,000
Burntisland	250,000
Boston, U.S.A.	2,000,000
Brisbane	1,500,000
"	300,000
Burton-on-Trent	1,500,000
Barcelona	350,000
Barking	100,000
Baerlien & Co.	20,000
"	420,000
Bombay	700,000
Buffalo, U.S.A.	550,000
"	500,000
Brooklim, U.S.A.	300,000
Bergen	250,000
Berlin	150,000
Bournemouth	1,000,000
Bridgeport, U.S.A.	500,000
Brunswick	300,000
Beck & Co., St. Louis	100,000
Barmen Rittershausen	600,000
Bexhill	125,000
Brooklyn, U.S.A.	1,000,000
"	1,000,000
Brunner, Mond, & Co.	400,000
Cheltenham	2,000,000
Cannes	200,000
Croydon	1,500,000
Copenhagen	200,000
Clevedon	200,000
Columbus, U.S.A.	500,000
Cincinnati, U.S.A.	1,500,000
"	1,500,000
Chicago, U.S.A.	3,000,000
"	1,000,000
"	1,000,000
Chemnitz	1,000,000
Crewe	1,250,000
Colonial Gas-Works Co.	100,000
Cadiz	300,000
Charottenberg	600,000
Dudley	750,000
Driffield	100,000
Dukinfield	500,000
Dover	750,000
"	1,000,000
Deal	200,000
Derby	1,500,000
Dublin	3,000,000
Dowlais	100,000
Douai	500,000
Denton	500,000
Derby, U.S.A.	350,000
Denver, "	500,000
" "	1,000,000
Düsselldorf	750,000
"	500,000
Dumfries	250,000
Dunedin, N.Z.	400,000
Darlington	1,250,000
Detroit, U.S.A.	750,000
Edinburgh	1,500,000
"	2,000,000
Enfield	300,000
Essen	300,000
Elbing	150,000
Falmouth	150,000
Frankfort	300,000
Farnworth	400,000
Fenton	400,000
Friedenshütte	500,000
Fürth	400,000
Freiburg	200,000
Goole	250,000
Glossop	300,000
Guildford	300,000
Gloucester	1,250,000
Gera	300,000
Grafton, N.S.W.	100,000
Grieg	300,000
Georgetown, U.S.A.	250,000
Gluckauf	200,000
Heywood	600,000
Holywood	125,000
Huy	70,000
Harrow	250,000
Harrogate	250,000
Halstead	150,000
Heilbronn	200,000
Havanna, Cuba	750,000
Hastings	1,500,000
Huddersfield	300,000
"	750,000
"	1,500,000
Hof	200,000
Hampton Wick	500,000
Heckmondwike	500,000
Haverfordwest	100,000
Halifax, N.S.	350,000
Hamm	200,000
Halle	400,000
Heidelberg	300,000
Hartford, U.S.A.	1,000,000
Ilkeston	300,000
Inverness	250,000
Ilkley	200,000
Ilford	100,000
Kingston-on-Hull	400,000
Kidderminster	750,000
Kidsgrove	100,000
Königsberg	1,000,000
King's Lynn	300,000
LONDON:—	
The Gaslight and Coke Co.:—	
Beckton	1,250,000
"	1,250,000
"	1,250,000
"	1,250,000
"	1,250,000
"	1,250,000
"	2,500,000
"	2,500,000
Silvertown	1,000,000
Bromley	2,000,000
"	1,500,000
"	1,500,000
"	1,500,000
"	2,000,000
"	1,500,000
Shoreditch	2,500,000
LONDON—*Continued.*	
Pancras	1,500,000
"	1,500,000
Pimlico	2,000,000
Nine Elms (2)	3,000,000
Kensal Green (2)	3,000,000
South Metropolitan Co.:—	
Greenwich	3,000,000
Woolwich	400,000
Vauxhall	3,000,000
"	3,000,000
Lea Bridge	300,000
West Ham	1,500,000
"	3,000,000
Leeds	2,000,000
"	3,000,000
"	3,000,000
"	3,000,000
"	3,000,000
"	2,000,000
Leominster	150,000
Leiden	560,000
"	600,000
Liverpool	2,000,000
"	2,000,000
"	2,000,000
"	2,000,000
"	2,000,000
" (3)	3,000,000
Lincoln	1,000,000
"	600,000
Lowell, U.S.A.	1,000,000
Laclede, "	1,000,000
Louisville "	1,500,000
Long Eaton	500,000
Lille	900,000
"	450,000
"	750,000
"	250,000
"	250,000
Luckenwalde	330,000
Liegwitz	300,000
Lincoln, U.S.A.	250,000
Lawrence, "	500,000
Lynn, "	300,000
Lyons	1,500,000
Maidstone	1,000,000
Marseilles	1,500,000
"	1,500,000
Mons	500,000
Malines	250,000
Melbourne	1,500,000
"	1,500,000
"	1,500,000
"	1,500,000
"	1,500,000
Manchester	2,500,000
Middleton	400,000
Manley, N.S.W.	100,000
Minneapolis, U.S.A.	750,000
Magdeburg	300,000
Memphis, U.S.A.	750,000
Nottingham	1,250,000
"	2,500,000
"	2,500,000
"	2,000,000
"	1,500,000
"	2,000,000
Newport, U.S.A.	430,000
Newmarket	150,000
Newark, U.S.A.	680,000
Northfleet	200,000
New York, U.S.A.	2,000,000
Nice	600,000
Newcastle, N.S.W.	200,000
Numea, "	100,000
Namur	250,000
Newark	350,000
Nassau, U.S.A.	1,000,000
Oldbury	500,000
Otley	200,000
Oswestry	250,000
Ober Schlesian	1,500,000
Otto & Co.'s Coke Works	1,500,000
Plymouth	2,000,000
Parramatta, N.S.W.	100,000
Prescot	150,000
Providence, U.S.A.	750,000
" "	750,000
Plauen	300,000
"	300,000
Portsmouth	2,500,000
"	2,500,000
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Portland, "	560,000
Pawtucket "	500,000
Quebec	250,000
Radcliffe	750,000
Rouen	250,000
Ramsgate	1,000,000
Reigate	200,000
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Roxbury, "	500,000
Runcorn Soap Co.	20,000
Rockhampton, N.S.W.	125,000
Richmond	1,500,000
Reading	2,000,000
Reichenbach	200,000
Salford	1,750,000
"	1,750,000
"	1,750,000
Smethwick	750,000
Sydney, N.S.W.	1,000,000
"	1,000,000
"	2,500,000
"	50,000
"	50,000
Sunderland	1,500,000
St. Joseph's, U.S.A.	250,000
Spa	100,000
Sevenoaks	300,000
St. Petersburg	2,000,000
"	1,500,000
St. Louis, U.S.A.	2,000,000
"	2,000,000
"	1,000,000
Silesian Coal Co.	600,000
San Francisco, U.S.A.	2,000,000
"	2,000,000
Sheepbridge Coal Co.	40,000
Stettin	200,000
Singapore	300,000
Sutton	500,000
Tonbridge	150,000
Tipton	400,000
Tottenham	1,000,000
Toledo, U.S.A.	750,000
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Uxbridge	300,000
Valparaiso	500,000
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Willenhall	250,000
Weston-super-Mare	500,000
Waltham	150,000
Wormwood Scrubbs	300,000
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" "	600,000
Wellington	150,000
Warwick	300,000
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Walker	300,000
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Weimar	150,000
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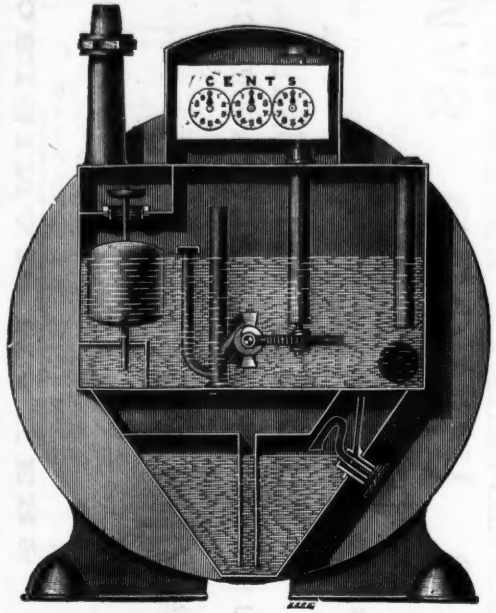
THE SYPHON OVERFLOW

— Wm. Cowan's Patent. —



To suppose, as some do, that the main object of the "Syphon Overflow" is to promote the convenience of inspectors and others who "water" meters, is to misapprehend the chief purpose of the invention. That the convenience of inspectors is promoted by the Syphon Overflow is a fact that admits of no doubt whatever, because the watering of meters is thereby greatly facilitated; but it is a mistake to fix attention upon this result, and to regard it as the only one attained. To do this is to lose sight of the chief purposes the Syphon Overflow was designed to secure.

These purposes were—

1st.—The **speedy** attainment of **exactly the same water line** on each occasion of watering.

2nd.—The **absolute certainty** of this water line being attained.

3rd.—The **impossibility** of any water afterwards finding its way into the waste-box.

The first and second of these conditions secure the interests of the gas company, whilst the third greatly promotes the convenience of the consumer, for reasons that are well known.

Who that has had experience of Wet Meters does not know the disadvantages of the "Low Spout?" The slowness with which it adjusts the water line, and the patience required while this is being done, are matters of every-day experience. It is therefore no wonder that the "Syphon Overflow" is regarded as one of the most important improvements ever made in the Wet Gas-Meter. It is not only an important improvement **in itself,** but it possesses the property of making all previous improvements more valuable and effective. It has, indeed, made the Wet Meter a more perfect, and, in every way, a more satisfactory instrument.

Narrow views as to price often prevent the adoption of real improvements; but it would be a narrow view indeed which would prefer a "Low Spouted" Meter to one with a "Syphon Overflow," because of the trifling difference in the price of the two.

— W. & B. COWAN, —

— ESTABLISHED 1827. —

SMITH SQUARE WORKS, WESTMINSTER,
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"DISC LONDON."

DUTTON STREET WORKS,
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EDINBURGH.
TELEPHONE No. 753.
"DISC EDINBURGH."

ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.
Since then we have not Exhibited for Prizes.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

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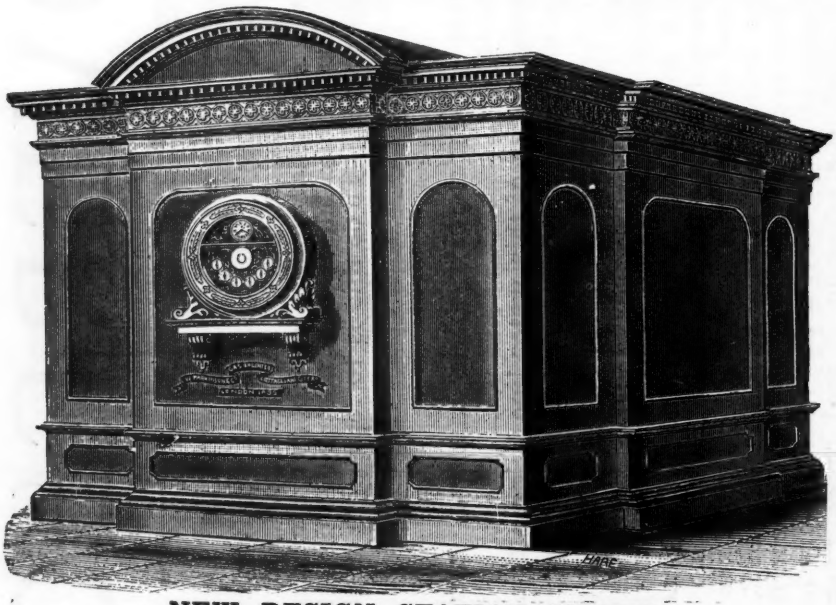
And at 37, BLACKFRIARS STREET, MANCHESTER.

TELEGRAPHIC ADDRESSES: "GOTHIC LONDON," "GOTHIC MANCHESTER." TELEPHONE No. 6725.

1st—Are a remedy for all the defects of Wet Meters.
2nd—Are suitable for all climates, whether hot or cold.
3rd—Incur no loss of Gas by Evaporation.
4th—Cannot become fixed by Frost, however severe.
5th—Are the most accurate and unvarying measurers of Gas.
6th—Prevent jumping or unexpected extinction of the Lights.
7th—May be fixed either above or below the level of the Lights.
8th—Cannot be tampered with without visibly damaging the outer case.
9th—Will last much longer than Wet Meters.
10th—Will not cost more than one-half for repair that Wet or Water Meters do.
Are upheld for five years without charge.

W. PARKINSON & CO.



NEW DESIGN STATION METER.

W. PARKINSON & CO. have introduced this design of Station Meter in order to meet the demand for a more ornamental Tank. All joints are planed, the most modern improvements introduced, and the entire Meter is of the strongest and most substantial description.

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Parkinson's Patent

THREE-PARTITION

MEASURING DRUM.

HIGHEST AWARD, MELBOURNE EXHIBITION.

MATERIALS and WORKMANSHIP of the VERY BEST QUALITY ONLY. PRICES, &c., ON APPLICATION.

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Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegraphic Address: "GAS-METERS."

OFFICE: 10, MAWSON'S CHAMBERS, DEANSGATE,
MANCHESTER.
Telegraphic Address: "PRECISION."

[See also Advt., p. 96.

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NOTICE TO SUBSCRIBERS

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 14, 1891.

The Societe Technique.

LAST week we gave a full abstract of the proceedings at the recent Congress of the Société Technique de l'Industrie du Gaz en France, under the presidency of M. Salanson. The position of this Association is very different from any British organization of the kind; at least two-thirds of the expenses of keeping it going being found by French Gas Companies, and only one-third coming directly from members' subscriptions. How many of these are actually paid by the Companies, there is no means of knowing; but it is safe to assume that the majority are provided in this way. This is all very well for some reasons; but the patent fact remains that the Society is the property of the Companies, and not of its members. And as it is everywhere understood that "whoever pays "the piper has the right to choose the tune," successive Presidents of the Society are very careful not to say anything in their addresses which might be distasteful to their chief paymasters. It is to this cause that we must ascribe the elaborate argument of M. Salanson in the first portion of his address, which was intended to support the thesis that progress in gas manufacture is compatible with fixity of the cost of gas making. With all respect to M. Salanson, who is a most accomplished and estimable gentleman, and making every allowance for his peculiar circumstances, as well as those of the Society, we are bound to confess that the supposed obligation to defend this thesis makes the whole address painful reading. M. Salanson is followed in the chair by M. Melon, who lately reported to the Technical Commission on the cost of gas making in Paris, that, in his opinion, the possible improvements which may yet be perfected in gas making will not appreciably affect the net cost of the product. Consequently, the President had to handle a subject which, always difficult, was on this occasion more than usually exigeant of delicate treatment; and he did it very well. At the same time, the whole address is a mournful illustration of the blight that lies upon the gas industry in France, and has been brought into prominence rather than relieved by the Parisian Technical Commissions.

We believe that the majority of the gas engineers of France, who are, as a body, very highly trained and well educated, would be delighted if they could be subjected to the commercial test of success which is operative in all open industries; but the concession system, with its fixed prices, ties them hand and foot. The French system of gas supply is radically wrong; and it is idle for M. Salanson or anybody else to reproach his countrymen with their indifference to the merits of a labour and money saving invention like that of M. Coze, for instance, as compared with the eagerness with which the same device has been experimented with in England. They have no spur to urge them on the path of progress, in which, for all that specious argument can advance to the contrary, engineering improvement and commercial advancement go hand in hand. It is no wonder that the Committee of the Société Technique do not intend to award a prize this year for any improvement in gas manufacture and distribution; there being nothing of the kind brought before them, and no candidate for such reward. The congresses of the Society are a means of pleasantly reuniting scattered members of a calling which condemns the majority of those who follow it to banishment from their professional brethren; and there will always be something to talk about which will serve to impart the requisite technical savour to the addresses and orations promulgated under the auspices of the Association. Until the paralyzing influence which we describe is taken from their counsels, however, it will be impossible for French gas engineering to figure worthily in the world, or its professors to take the leading position among their colleagues of all nations to which their talents entitle them.

Labour Topics.

THE professional managers of the Gas Workers' Union have taken to holding Sunday meetings in the proximity of the South Metropolitan Company's works; presumably with the object of attracting support from the present members of the Company's working staff. These meetings are under the management of that singular specimen of the British workman, Dr. Aveling, who, with one or two others more "to the manner born" than himself, is essaying the desperate task of converting the South Metropolitan men into supporters of the Union. Remembering what the Union leaders have, in times not long past, said of these very men, this bitter cry argues the presence of a magnanimous spirit, or a hollow treasury, in Union circles. Those who know the character of the Union wire-pullers best will be best able to choose the right interpretation of their present conduct. There is not much chance of the Union propaganda meeting with a favourable reception from men

whose actual means of livelihood would never have been enjoyed by them if their predecessors had not been foolish enough to trust to Thorne and Company's promises; but, if only for the sake of showing that a man need not take leave of his senses and his regard for truth when he becomes a Union partisan, Thorne really should look after his recruits. Of what service can it possibly be to the Union for men to stand in the Old Kent Road and assert that the South Metropolitan stokers are joining the Union in hundreds, that the bonus scheme is being dropped, and that the Company's men are being forced to submit to alterations of their agreements, and to utter similar outrageous falsehoods in the hearing of those who could correct the misstatements instantly, if they thought it worth while? Has lying served the interest of the Union so well in the past that the same string can be relied upon to "work the oracle" now?

The dispute between Mr. Sutherst, the Trades Council, and John Burns continues to be amusing and instructive. The former gentleman accuses the Trades Council of not being representative of the great bulk of London workmen. He also declares that John Burns does not represent anybody but himself; and he urges his chosen clients, the London omnibus men, to have nothing to do with either of these rivals to himself for the honour of leading them to greater victories. Meanwhile, it is interesting to learn, from undoubted New Unionist sources, that John Burns has actually discovered another London trade—that of the picture-frame makers, who are alleged to be 10,000 strong, and therefore worth organizing, with a view to future threepences. There used to be a trade, worthy of the name, known as the carvers' and gilders', but we gather that Burns's new discovery is of cheap hands who nail together machine-made mouldings—a very different class of workers, who can no more carve than they can gild.

The Labour Commission is progressing in the tedious and difficult task of laying out its work and arriving at some sort of agreement respecting the kind of evidence it shall take for the multifarious industries of the land. The Secretary (Mr. Drage) is working very hard at this unobtrusive and therefore unrecognized task of preparation; and his staff are one and all qualifying themselves to give evidence, from personal experience, of the evils of overtime employment. The gas and cognate interests are not unforgotten by Mr. Drage. But it is unlikely that these will be reached for some time; and when they are, they may require the attention of more than one of the groups into which the Commission is of necessity divided. Notwithstanding the general desire to check all but strictly natural and necessary developments of the task of the Commissioners, many years' work appears to lie before them; and it becomes a question how many are likely to live to see the report which should be the outcome of their labours. It is satisfactory to note that the further the inquiry progresses among the defined trades, the more the Social Democratic notions of the Cockney agitators are utterly discredited by operative witnesses.

Metropolitan Gas Testing.

An evening paper last week fell foul of the law and of the South Metropolitan Gas Company, upon the occasion of proceedings of the now familiar kind which resulted in the Company's conviction, at the Greenwich Police Court, as reported elsewhere, for supplying gas below the standard illuminating power, and the infliction by the Magistrate of two penalties of 20s. on the culprits. The newspaper critic wanted to know why, if a milkman is fined £5 or £10 for selling watered milk, a Company "turning over "hundreds of thousands per annum" is supposed to feel a 20s. fine as a punishment; and he suggests that in such a case it would be better to "lock up a Managing "Director." This commentary, appearing in an "organ" which is popularly supposed to represent the views of the "Progressist" majority of the London County Council, is significant of the ideas which some people, at any rate, have gathered from the ridiculous prosecutions of the London Gas Companies which have attended the modern development of photometrical instruments without a corresponding improvement of the standard of light. Our "Progressists" no doubt believe that if a Gas Company can get out of a conviction for deficient illuminating power for a paltry fine of 20s., it must be "good business" for them. According to those broad and liberal views of policy which distinguish the majority of the County Council, and are mirrored in the New Journalism of which the *Star* is the brightest example, it must be a foolish Gas Company who would spend thousands of pounds in order to avoid a fine of a sovereign; and the "knowing "ones" probably scout the notion of anything of the kind being actually done. Our evening contemporary has heard, from its supporters in the Council, that this body are "negotiating for some improvement on the "present method of testing;" and sagely observes that it "would be better pleased to hear that they were "seeking to obtain some more effectual means of keeping "the Gas Companies up to their duties." That the two things have any connection with each other has not dawned upon the intelligence of this smart journalist. By the way, how curious it would be if the quality of the news and editorial matter of newspapers were subject to regular tests, followed, if required, by summary proceedings before a Magistrate! How strangely some of those critics would figure who make such a point of righteousness in others! The idea is absurd, of course; for we all know that the freedom of the Press is involved in the right of newspaper reporters and partisan editors to colour and garble facts at will, without the fear of Adulteration Acts before their eyes.

The Bristol Bill.

The Bristol Gas Bill has passed the Commons Committee, and there is now nothing to stop the Directors from realizing, at the earliest possible moment, their longing to turn the Company's nominal 10 per cent. stock into equally nominal 5 per cent. stock. How much better off the Company will be for the alteration it would puzzle even the author of the grand idea to explain to the contentment of half-a-dozen indifferent citizens. So far as we can interpret the recent proceedings in Committee, the promoters were permitted to have their way in this matter through the almost contemptuous complaisance of the honourable members who adjudicated upon it. The opponents of the Bill talked in a very ugly way about the existence of a notion on the part of the Directors of the Gas Company that the nominal reduction of the rate of dividend on the stock would "gull" the local public. But it is, of course, the cue of opponents to make themselves disagreeable; and in this case the temptation was great. We have no doubt that the policy of the Directors is explainable fairly enough without the use of such harsh terms. There is something, if not very much, in the argument that when 10 per cent. capital only returns to the purchaser about one-half of this rate of interest, it is a gratuitous advertisement of the wealth of the concern having such capital to adhere to a nominal rate of dividend which is an exaggeration of the facts. All the same, original gas capital does pay 10 per cent., and more, to those holders who were lucky enough to get it at par; and the device of concealing this circumstance in the fashion adopted by the Bristol Gas Directors too closely resembles a subterfuge to recommend itself to the consciences of those straightforward people who, not being averse to receiving a particular rate of return upon an investment, are not ashamed to have the fact publicly known. It is for this reason that we think the Bristol policy an unworthy one. It is a poor compliment to the local public, whose intelligence is, by implication, supposed to be unequal to the realization of the truth that twice five are ten; and it is, in our judgment, in every sense uncalled for. It could be understood that the management of The Gaslight and Coke Company, for instance, would be glad if all their multitudinous statutory rates of dividend could be reduced to a simple uniform expression; but this is a very different matter from the Bristol performance, which, if it fails to hoodwink the public, will have no other excuse to rest upon.

Salford in Parliament.

The experience of the Salford Corporation this session corroborates the ancient view of the comparative desirability of a Bill and a Provisional Order, under certain conditions. It used to be said that, where there is the least fear of opposition to a projected measure, it is better to proceed by Bill; but an unopposed scheme of private legislation can be very cheaply and conveniently furthered by a Provisional Order. Salford now knows that this is a true saying. At the same time, the Corporation are not to be blamed for the course they took, for which there is

ample precedent. Of late years some big concerns have resorted to Provisonal Orders in regard to business which they would once have transacted as a matter of course by Bill; and heavy additions to the capitals of various public and private gas and water works undertakings have been legalized by this short and easy method. Manchester, for example, having had recourse to the Local Government Board when an increase of Corporation gas capital was required, Salford followed suit, and endeavoured to raise £134,000 of additional money by the same sanction. Unfortunately for the success of this proceeding, some of the out-townships rose in arms, and began to accuse the Corporation of serving them unjustly in various ways with regard to the supply of gas—such as charging an excess rate, applying all the profit made for the benefit of the borough only, and generally "acting in a manner "wholly inconsistent with the fiduciary position in "which the Corporation stand to the general body "of their gas consumers." Alas! it is too probable that as much, and more, might be said of many another gas-supplying Corporation. However, it is to be hoped that the gas consumers of Swinton, Pendlebury, Eccles, and the other districts which have thus complained of Salford, will bear in mind the terms of this reproach, in case they require something of the kind for home use at a future time. The Salford Corporation Provisional Order was approved of in the ordinary course by the Local Government Board, and duly included in a Confirming Bill, when it was opposed, and referred to a Select Committee, just as though the Local Government Board had not gone to the trouble and expense of considering it. Before this Committee the Corporation and the Local Boards prepared to fight one another in the desperate way usual with conflicting Infallibles of the kind, until it appeared that the best way of settling the difference between the parties was by a "deal." After much haggling, the opposition was withdrawn, upon the insertion in the Corporation Order of permission to purchase the outlying portions of the gas undertaking, subject to the approval of Parliament, with the question of the legality of excess rates in the outer districts expressly reserved. Therefore, it is quite within the bounds of possibility that Eccles, Swinton, &c., may live to do to others very much as the Corporation of Salford have hitherto done to them, according to the manner of centrifugal local authorities all over the North of England. We have not heard the last of this matter; for it is to be supposed that the Local Boards will not suffer their parliamentary victory to remain barren, and the consequential proceedings bid fair to be exceptionally interesting.

Mr. Preece's Address Again.

JUST as we expected, Mr. W. H. Preece's oration to the Municipal and County Engineers upon the cost and advantages of electric lighting as compared with gas has been copied from the JOURNAL into most of the technical and many of the ordinary newspapers of the country. It has also started on its rounds *viâ* the Continent and the United States; and in the course of a few months some of the leading statements will in all probability be re-translated or re-abstracted from foreign periodicals by our most modern "up-to-date" journalists, and published in all innocency as fresh matter. We have seen this course followed in instances too numerous to quote here. However, we have no desire to "expose the trick" of New Journalism too harshly; and so long as what gets into circulation round and round the world in this way is the truth, it matters very little where it originates. But in the present case, the joke is that Mr. Preece's statements are in many places taken in all seriousness as facts. We have received newspapers containing impassioned attacks upon the administration of local gas undertakings because these authorities have appeared strangely indifferent to the remarkable "facts" and figures of Mr. Preece's address. This is intelligible, for it is hardly to be expected that newspaper readers everywhere should be aware of the necessity of looking very carefully into the justification for the glowing estimates of eminent electricians, even when these have the magic initials F.R.S. after their names. Gas engineers know well enough that the truth bears no higher proportion to the imagery of such compositions as this of Mr. Preece's than Falstaff's bread did to his liquid refreshment. The comparison is stale, we admit; but so is the trick.

WATER AND SANITARY AFFAIRS.

THE Select Committee on the Metropolitan Water Supply met on Wednesday last for the further consideration of their special report. Some time is said to have been spent in discussing a draft report submitted by the Chairman (Sir Matthew White Ridley), after which the Committee adjourned until to-day. Concerning the nature of this draft report, a statement has appeared to the effect that its proposals "have relation mainly to the necessity for "further inquiry," as a condition precedent to legislation. There is a little obscurity in the phraseology of the sentence from which we are quoting; but we believe we have given its correct meaning. It is further alleged that the London County Council is mentioned in the report as the body to which the future investigation "might be entrusted." From this an "inference" is drawn that, in the view of the Chairman, it is upon the London County Council that the duty of controlling the water supply should ultimately devolve. With respect to the acquisition of fresh gathering-grounds, Sir Matthew White Ridley is said to be in favour of the appointment of a Royal Commission to consider the whole subject. If the report, as finally adopted, is to go no further than this, it must be acknowledged that the labours of the Committee are indeed—as we lately suggested—purely initiatory. At the time of its appointment by the House of Commons, it was an instruction to the Committee that they had "power to inquire into all "matters connected with the nature, price, management, "sources, and sufficiency of the water supply of London "and its suburbs." When urged to make some addition to the terms thus laid down, Mr. Ritchie replied that the instruction seemed to embrace everything that could possibly be referred to the Committee. There is no doubt that the task assigned was a heavy one; and the Committee have found it so. Accordingly, they are going to propose that the completion of the work shall be handed over to somebody else, or rather to two other bodies, if the story set afloat be correct. The scheme for a further inquiry corresponds with singular exactitude to the plan which Mr. C. Harrison suggested in the course of his evidence before the Committee, and we should hardly have thought it would have re-appeared in so exact a form in the actual report. If any reliance is to be placed on the statement that has gone forth, but which for the present has only the authority of a journalistic paragraph, the report of the Committee will do little to advance the important question with which they were appointed to deal. If a public authority is to have possession of the water supply, and if competition would be "suicidal," as acknowledged by the County Council Engineer, why is the acquisition of the existing undertakings put at the end of so long a process? Is it, after all, the fact, that the question is so big as to frighten everyone who comes face to face with it? The Select Committee seem fairly to have broken down under its weight. The subject of "purchase" presents itself; and the answer is "further inquiry." If the Committee would act with boldness and decision, the end might not be far off. But their report, as shadowed forth, is big with delay. There is also reason to believe that the draft submitted by the Chairman is not received with unanimity by the Committee.

The Massachusetts Municipal Lighting Bill.—In the JOURNAL for Oct. 21 last year we mentioned that the Massachusetts State Legislature had had a Bill before them to enable cities and towns in that State to provide gas and electricity. The Bill, of which we gave an epitome, passed in the Lower House; but was thrown out in the Senate. The measure, or one on similar lines, has now, however, become law; and under its provisions it will be comparatively easy for towns to establish their own gas-works or electric lighting plants, while, on account of the obstacles which private interests may interpose, it is made more difficult for cities to take advantage of the Act. In the case of towns, the step can be taken when a resolution has been passed by a two-thirds majority to that effect at two successive town meetings, the second of which must be held after an interval of not less than two nor more than thirteen months. When the resolution has failed at the second of the meetings, no similar vote can be taken for two years. Before a city can take advantage of the Act, a vote that it is expedient to exercise the authority which it confers must have passed each branch of the Council by a two-thirds majority, and received the approval of the Mayor in each of two consecutive municipal years, and then be ratified by a majority of the voters on the subject at an annual municipal election.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 85.)

THE fair promise of an improvement in the Stock Markets which was being made, has not been maintained in the week just closed. There has not been any considerable falling away in prices; but the tendency generally was downward even in first-class securities. A good deal of this is, no doubt, attributable to the weakness which proceeds from lack of business; the week having presented many counter-attractions in the shape of pleasure, or what passes for pleasure. Boating at Henley, cricket at Lord's, racing at Sandown, potentates at the Guildhall, and a general adjournment to Wimbledon on Saturday, have been more attractive (and perhaps not much less profitable) than standing waiting in the market for the business which does not come. In the result, business was very quiet. The Money Market presents no particular change; great ease being still the characteristic. The Gas Market has been, like all the rest, in a state of semi-animation; but unlike the rest it has not drooped—the tendency being quite the other way. Among the Metropolitan undertakings, Gaslights have taken the bulk of the business. The "A" was moderately deal in, at good figures—touching top price on Monday. The secured and limited issues were in very good demand; and the latest and apparently most popular issue, "K," rose 1½, with business done at the tall figure of 159½. A single transaction in "B" was all the attention given to South Metropolitans; but the improving tendency was marked by a further advance of 1 in the quotation. Commercials attracted no notice whatever. One or two dealings in British and in Brentford debenture were the contributions of Suburbans and Provincials; but Alliance and Dublin, though not dealt in, improved ½. The Continental group were quiet, but firm and unchanged; and the last bargain marked in Imperial Continental was as good as 228. Of the South Americans, Monte Video showed a disposition to improve. The Indian section presented the only instance of a retrogression, with a fall of ½ in Oriental. The rest were without feature. The Water Companies furnished very little business; and the only move was a rise of 1 in Lambeth.

The daily operations were: At the opening on Monday business was very much restricted in the Gas Market (being confined to Gaslight "A" and Imperial Continental), and nothing changed. More activity was apparent on Tuesday; and Gaslight "K" rose 1½, and South Metropolitan "B," 1. Wednesday showed equal firmness in general; the isolated exception being a fall of ½ in Oriental. Thursday furnished no incident calling for remark. Friday's business was extremely limited; but prices were good. Alliance and Dublin improved ½. In Water, Lambeth rose 1. The Stock Exchange was closed on Saturday.

ELECTRIC LIGHTING MEMORANDA.

The Edison Interest at Home and Abroad—The Nature of Edison's Invention—An Electrical Critic on Street Lighting—Electrical Primers.

THE Edison and Swan United Electric Light Company appear to be doing pretty well. The accounts of the Company for the past year enable the Directors to declare a dividend after the rate of 7 per cent. per annum for the last six months; making, with the interim dividend paid in February, 7 per cent. for the entire year. A further dividend of 10 per cent. in respect of arrears of cumulative preferential dividends is also to be distributed in accordance with the Articles of Association. This profit, it is worth noting, has been made mainly out of the sale of incandescent lamps, and royalties on the Company's monopoly. While the Company engaged in lighting they lost money; and it was an indication of good management when the Directors cut adrift from all speculation of this nature, and confined themselves to the supply of indispensable plant to those who undertook lighting contracts. Nevertheless, the Company did not arrive at their present comfortable position without a good deal of fighting, which burdened the concern with heavy law costs. In Germany, the Edison and Swan interests are still at variance, instead of being fused as they have for some years been in the United Kingdom. And in the United States the validity of Edison's fundamental lamp patents is still awaiting the judgment of the ultimate Court. There is nothing new in the issue between those who are defending and those who are attacking Edison's claim to priority in the invention of the incandescent electric lamp; but fresh arguments upon the familiar points at issue do not tend to make his position look more secure. It is generally conceded in the States that he is the parent of incandescent electric lighting; but there is much uncertainty regarding the legal question whether the nature of the invention by which he claims control over subsequent developments of this order of lighting is clearly described in his fundamental patent.

The question is intelligible enough. In 1879, or thereabouts, when electric lighting was only known in the shape of the arc, great excitement was caused by the report from the United States that Mr. Edison had solved the problem of the subdivision of the electric light. It was this announcement in the columns of *The Times* that caused the memorable fall in gas property all over the world. It is obvious, however, that the discovery of a means of subdividing electric light may be one thing, and the perception, from the beginning, of the essential features of what has since turned out to be a staple article of commerce, such as the incandescent electric lamp, may be another matter; and the question is whether Edison combined the latter with the former. This is the point the United States Court has to decide; and with the decision goes the commercial future of the Edison Company in that country.

Our contemporary the *Electrician* recently indulged in a not very coherent disquisition upon street lighting, apparently inspired by the revived Brush experiment in Queen Victoria Street. The gist of this composition was not at all easy to make out. In one place the writer sneered at what passes for street lighting by arc lamps in American towns, and observed that we need not go to the United States to copy street lighting, any more than we should emulate their elevated railways or their trolley-wire tramways. Then the author allows us to see that he has not forgotten the unsatisfactory street lighting experiments in the City of London ten years ago, when the Siemens and Brush systems were found wanting in the essentials of good lighting for this purpose, and were removed, after fair trial, to the general relief of wayfarers. After this he discusses the new Brush venture in the same line, and protests against the notion that an experiment of the kind can be properly judged by the public in the height of summer. Yet the end of all this depreciatory reference to the use of electric arc lamps for street lighting is a declaration that the majority of the people of London will be convinced by the City experiment that "an illumination ten times greater than that which they now have is absolutely indispensable to their convenience and safety." This statement recalls Dogberry's description of something which was "most tolerable, and not to be borne." We agree that the best system of street lighting for the City, which allows of the heaviest traffic being conducted with the minimum of risk, ought to be the indispensable system; but whether this is to be the character of the Brush lighting, which has failed before, is another matter.

We have already formally acknowledged the receipt of two electrical "Primers" published by our contemporary, just referred to. Of the making of books upon electricity there is no end; but most of them are apparently intended to advertise their authors rather than to diffuse knowledge of the subject. Good manuals dealing with the modern development of electrical engineering are few. The two Primers in question are supposed to be devoted to different subjects—one to "Theory," the other to "Practice." Such a division as this must be very well and rationally carried out if it is to be excused; and we cannot see any excuse for it in this case. There is not enough theory in the theoretical Primer; and it is impossible to understand much of the practice without accompanying explanations of the end in view, which is theory. Candidly, we are disappointed with these books, and cannot recommend them to students. They contain a good deal of matter for their bulk; and they may possess some value as illustrated catalogues of electrical apparatus. But their instructional power is low. What can be thought, for instance, of a book which has a chapter on electrical meters, concluding with a postscript of a few lines, which is the only attempt made to explain what is meant by the term "unit of electricity"? Also, in another place we are told that "no exact ideas are possible about the action of electricity without a thorough understanding of Ohm's law." To this most important subject four pages are devoted, which, we undertake to say, will leave the average "student and general reader," for whom these books are ostensibly written, about as wise as he was before he looked at them. It would be instructive to know whether a "thorough understanding of Ohm's law" is common among electricians. The great Edison is reported to have avowed that he could not rank himself among this enlightened number; venturing even to stigmatize study of Ohm's law as a hindrance to work. We cannot tell how this may be; but we certainly do think that, unless our contemporary could have better explained these mysteries, it would have been better to have left them alone.

An Electro-Magnetic Gas Controller.—Mr. J. M'Laren, Electrical Engineer of the Edinburgh Public Library, has patented an invention by which, in the event of the electric light failing, the gas-lighting (the fittings for which are provided) would be automatically brought into use. The invention is a very simple one; consisting of an electro-magnet which keeps a valve in the service-pipe closed while the electric current is on. On the current being cut off, the magnet ceases to act, and a screw opens the valve. An independent pipe serves a small feeder jet; so that, on the gas being allowed to pass into the ordinary pipe, the lamps are at once lighted. Experiments have been tried with the appliance in the Library; and they are said to have given satisfactory results. It is claimed for it that it will be cheaper than to make use of accumulators. The invention may probably turn out to be of some value; but as yet it only furnishes an illustration of the fact that, however much electricians may boast of the advantages of electric lighting, they have a rooted conviction that it is far from being a reliable illuminating agent. If they could point to a single instance in which gas-fittings were furnished with an appliance which, on the failure of the gas supply, would turn on the electric light, they would be justified in raising a shout of triumph; but they cannot. The fact remains that gas is the standard light, and that all other lights are but substitutes for it.

PROFESSOR LEWES'S NEW PROGRAMME.

It must have occurred to most thoughtful hearers and readers of Professor Vivian B. Lewes's Gas Institute paper, that this production furnishes one more addition to the pile of evidence which has been for some time accumulating to establish Professor Lewes as *facile princeps* among the chemists of the time who have made a specialty of the study of what may be called the commercial gases. Following so soon after two papers contributed to the Society of Chemical Industry, and preceded, by only a few months, by a really masterly series of Cantor Lectures devoted to the same order of subjects, this Gas Institute paper was not only interesting and instructive in itself, but was even more satisfactory as an indication that a chemical expert of first rank is at work in our midst, not only "taking notes" of the development of contemporary ideas, but also setting himself in no weak or half-hearted fashion to guide and control them. The gas industry has been fortunate in the past in attracting and keeping the attention of a brilliant succession of experimental chemists. From time to time, as circumstances have demanded that gas engineering should be enlightened upon special points of theory and practice by the lamp of Chemistry, competent practitioners have arisen to contribute to the advancement of the gas industry of their day; and their names are honourably recorded in the chronicles of the art. In these times, while gas engineers are exercised respecting many problems which they must solve as best they can, one question—novel, and yet old—occurs to impel them to confer with Chemistry as with an ally having authority. This is the general question whether it is possible to supplement the production of coal gas in the United Kingdom with illuminating gas made from any other source or raw material. The problem is an old one, in the sense that attempts to supplant coal gas by something better, cheaper, or in some way preferable, are never long untried. It is new, inasmuch as the statement has been made, upon good authority, that the commercial considerations that have hitherto secured supremacy to coal gas have yielded so far as to admit the possibility of using in certain British gas-works raw material of gas making other than the traditional coal and cannel. The solution of this problem with due regard to its modern factors, is the ground on which contemporary gas engineering and chemistry meet with a common interest.

The chemist who has had most to say upon this subject is Professor Lewes; and he has, in truth, said a good deal about it that is in the highest degree instructive. What strikes a critic most in Professor Lewes's contributions on this particular application of chemistry to a question of gas making, is the fact that he does not so much discuss as contribute fresh material to the stock of information which is already available for public guidance in the practical development of the problem. Chemical criticism is cheap enough, as every technical journal witnesses; but constructive chemistry is extremely rare. What is it that makes the work of men like Sir Lowthian Bell, Mond, Young and Beilby, and many others that might be named, so interesting; and the common run of discussions of chemical formulæ, &c., so deadly dull? Simply that the former class of chemists are producers. They work to learn, and they speak to enlighten. Similarly, from the day when Professor Lewes went into the chemistry of the commercial gases, his frequent papers have been marked, not so much by dry references to other men's statements, as by suggestive information obtained by diligent research, corrected by sufficient mastery of fundamental principles.

This being so, the question may well be asked, How does Professor Lewes manage to produce so much that is worthy of being called information about gas analyses, carburetting processes, water-gas manufacture, and what not? The answer is, Simply by dint of hard, but intelligently-directed labour in laboratory and gas-works. When Professor Lewes was first consulted with reference to the Van Steenbergh venture at Knightsbridge, he perceived that this would be a splendid opportunity for studying the reactions that take place in carburetted water-gas production; and he threw himself into this work with zeal—sacrificing to it time and pains out of all proportion to the immediate interests at stake. It would have been the same, of course, with any other system of water-gas manufacture; because water gas is water gas all the world over, and differences of plant are insignificant beside the great gap that divides any description of gas manufacture involving the use of an open generator from that depending upon distillation of raw material in a closed retort. From this study of water gas, Professor Lewes went on to investigate carburetting methods in general, with the object of discovering what it is, chemically, that goes to the concoction of any special grade of illuminating gas, whether produced from coal alone, or mixed. This inquiry brought up the complex question of the trustworthiness of methods of gas analysis; but even this addition to his labours in gas chemistry did not overload Professor Lewes, for he found an opportunity to make an important *excursus* into the region of gases of combustion. All this time, be it remembered, there were the duties of the Chair of Chemistry at the Royal Naval College, Greenwich, to be attended to, besides the delivery of University Extension and other lectures every evening, and the preparation for the Institute of Naval Architects of papers on the spontaneous combustion of coal cargoes and boiler deposits, &c.—all involving new and original experimental demonstrations. Moreover, Professor Lewes was a Gas Examiner for the City of London—an invaluable experience for a chemist applying himself to the problems of gas industry; but a considerable tax upon a busy man. It is not surprising, therefore, that he has been compelled to give up his gas testing, since last winter.

Winter is the lecturing season; and then a popular and efficient lecturer like Professor Lewes has his hands full. But summer is his season for study and fresh experimental work, without which a man who has to teach must soon become as "sounding brass or tinkling cymbal." This is the cause of so many "professors" becoming a byword for professions which have no reference to practice. The temptation to dogmatize from "authority" is one of the besetting troubles of men of science, from the instant when they become known to the commercial world as reliable reporters upon new schemes, expert witnesses, &c., and have accordingly insufficient time for absorbing fresh strength from the source of all scientific truth in Nature, to make up for their expenditure in the way of business. As a rule, the better known a man is as an "expert," and the more lucrative his connection in this way of bending science to the service of man, the less value he is to the world. He gives up research, because oracular speaking pays so much better, and only involves the trouble of refreshing his mind occasionally by feeding upon the brains of younger and less-known men. Professor Lewes seems to be fairly on his guard against this danger; although, of course, his time may come for leaving off work, assuming the halo of an F.R.S., and talking at large (for a commensurate fee) about science in connection with heavy patent cases. At present, however, Professor Lewes is even more conspicuously a worker in gas than he is a speaker about gas matters. He has at Greenwich a private laboratory upon an extensive scale, and experimental gas-works, where, with the help of skilled assistants, he makes, analyzes, burns, and tests commercial gases day after day, in the pursuit of certain lines of research which he has marked out for himself.

The character of one of these lines of investigation may be briefly indicated. It is by this time abundantly established how the various British coals and cannels should be carbonized in order to obtain the best average results from them. This is, of course, a generalization, which may be open to exception in some points of detail, and does not preclude variety of opinion in regard to diversities of plant, &c. The case is altogether different with hydrocarbons in the liquid form, intended for the production of gas either to be burnt by itself or to be used for the purpose of enriching other gases. Given a sample of oil, we want to know what is best to do with it by way of gas making—whether to carbonize it in a closed retort, to "crack" it in a bed of incandescent fuel, to gasify it upon a neutral surface in a current of hot gases, or to drop it altogether in favour of something which may be dearer at first but more convenient or efficient in the end. Before such a query can be answered, many tests must be made of the sample; and every one of these must be carried out and classified and interpreted by a man who knows what he is doing. The mere making of an experiment is nothing; the difficulty is to recognize and to reason aright from what experiment discloses. Before a sample of oil can be regarded as properly tested in a retort, for instance, it must be carbonized in the same kind of retort—say a Pintsch, a Tatham, or any other pattern of the apparatus—at three or four different temperatures; and account must be duly taken of all the products at every temperature. Thus, beginning at the lowest working temperature, each experiment must embrace a return as to the quantity of gas obtained per unit of the oil carbonized, its illuminating power, specific gravity, and proximate composition. Then we must know how much residuum remains in the standard condensers, and what it contains. This record must be repeated for every distillation, until it can be seen how to get the most out of the sample, if it is carbonized in this particular way. But this is only the beginning of the test. If the examination is to be complete, we ought to know how the sample will behave if "cracked" in different ways, and what it will do for a combustible carrying gas, with or without oxygen—whether the carrier be poor coal gas, water gas, or hydrogen.

Then, of course, if oil is to be studied in the light of its suitability for different treatment in connection with illuminating gases, every description of these must also be worked out in connection with the determination of the most suitable kinds of carburetters available for use with it. Starting with 15-candle coal gas, for instance, it may be requisite to know, with reference to data which necessarily vary in every instance, how this may be brought up to pass muster as 16-candle gas at a distance of a mile or more from the place of manufacture. Cannel, oil gas, carburetted water gas, hydrocarbon spirit, are all available for this work, at a price; but which is the best to use in a particular case? Such as these, and many others, are the problems which, at his Greenwich laboratory and elsewhere, Professor Lewes has set himself to solve with a degree of precision hitherto unrealized. None knows better than he the difference between laboratory, or even experimental, and commercial work. Thus results which he gets from his experimental retorts he checks

by testing upon a larger scale elsewhere. He is too practical-minded not to entertain the deepest respect for "rule-of-thumb," in the sense of that rough-and-ready, reliable way of working by the simplest rules to which all manufacturing processes must come if they are to command universal adoption. But his aim is to arrive by skilful manipulation, tested at every point, at certainties which may be called theoretical, in so far as they shall be superior to, and serve as guides for, the less perfect methods of working that must be followed in the factory. It is evident that there is work in this programme for the busiest chemist; and it speaks loudly for Professor Lewes's confidence in the pressing nature of the problems which he has taken in hand, that he should have devoted so much of his time, and made such elaborate arrangements, to this end. It will no longer be surprising to our readers that a trained experimentalist who works in this way should be able to throw off a paper or two, or prepare a course of lectures, on particular branches of his self-imposed task. Indeed, he can hardly fail to learn very much more of his subject than he can expect to convey to others by ordinary means of imparting information; and we feel quite justified in believing that if Professor Lewes continues at his programme long enough to see the end of it, he will know more about the possibilities of gas carburetting, under the conditions prevailing in the United Kingdom, than any other chemist has discovered.

The Accrington Gas and Water Company have appointed Mr. J. Burton, of Colne, to be Manager of their Great Harwood Gas-Works, in succession to the late Mr. J. Barker.

Mr. Frederick Egner, whose removal from the position of Superintendent of the St. Louis (U.S.A.) Gas Company was commented upon in our issue for June 30, p. 1293, has been appointed Chief Engineer of the Standard Gaslight Company, of New York City.

Water-Pipe Discharge Diagrams.—We have been favoured by Messrs. E. B. Taylor, M. Inst. C.E., and G. M. Taylor, Assoc. M. Inst C.E., with a copy of the useful series of water-pipe discharge diagrams drawn and complied by them, and just published by Mr. B. T. Batsford, of 52, High Holborn, There are altogether fourteen large diagrams (15 in. by 8 in.), showing the relation between the diameters, gradients, and discharges of water-pipes, and giving the proper weights and thicknesses of pipes for various pressures; and they are accompanied by explanatory letterpress. The object of the authors, as stated by them in their preface, in preparing the diagrams, was to avoid the perpetual repetition of calculations for finding the discharges of water-mains; and it occurred to them that this end would be attained by the adoption of a series of curves in some diagrammatic form. After trying various arrangements and scales, the plan employed in the plates now under notice was, on the whole, found to be the most convenient; and the authors (who are members of the firm of Messrs. J. Taylor and Sons, Engineers of the Lambeth Water-Works Company) have since made continual use of a set of diagrams upon this model. Very considerable advantage has, they state, been found in their employment, both in time saved and in the feeling of certainty that the result is free from error of any appreciable magnitude. They are intended to apply only to pipes running full under a constant head. It only remains to add that the dragrams as well as the letterpress are excellently printed on stout paper, and bound in cloth boards.

A Water Tunnel under the Thames.—Our readers are aware that the Southwark and Vauxhall Water Company have for some time had in hand measures for increasing the supply of water for Nunhead and the district by laying down a second main from their station at Hampton. The work, which has been carried out under the supervision of their Engineer (Mr. J. W. Restler, M. Inst. C.E.), involved the construction of an iron subway under the Thames just below Kingston Bridge; and this has recently been completed. It is circular in section, 9 feet in diameter, and made of cast-iron plates 1 inch thick, bolted together in segments forming rings 18 inches deep. The method employed in driving the tunnel and fixing the plates was as follows: An iron shield, of slightly larger diameter than the subway itself, was forced forwards into the clay by powerful hydraulic jacks for a distance of about 18 inches, sufficient to insert one ring of the cast-iron plates. These were then fixed and bolted together in position, and the shield again impelled forward as before. By these means the earth in the tunnel was taken out as nearly as possible to the precise dimensions of the iron rings to be inserted. In order, however, to make the work perfectly solid and secure, a grouting of liquid cement was forced in behind and around the rings when finally fixed; thus filling up every possible fissure and crevice between the iron and the surrounding clay. The subway is 600 feet long under the river; and it has been completed in the remarkably short space of nine weeks. The whole length of the tunnel is in the London clay; and at one point the thickness between the top of the subway and the bed of the river is only 2 ft. 6 in. The cast-iron main, 42 inches in diameter, which conveys the water from Hampton to Nunhead is divided, in the tunnel, into two pipes, each 31 inches in diameter. The work has been carried out by Messrs John Aird and Sons.

NOTES.

Another Oil-Gas Machine.

Yet another so-called oil-gas machine, intended to produce a kind of gaseous fuel by carburetting air with petroleum vapour, has been brought out in the United States, and is generally described in the *American Manufacturer*. In this machine the oil is "disintegrated" by contact with a strong air-blast, which enter through the bottom of the "generator." The resulting spray is driven successively through a number of compartments closed by perforated discs, of graduated fineness. Every hole is expected to act as a spraying-tube, the spray becoming gradually finer until the topmost disc discharges only "a homogeneous mixture of air and atomized oil." It is stated that the violent atomizing of the oil produces intense cold; and the moisture contained in the injected air is condensed and frozen into small pieces of ice, which return with the oil that does not pass away as "gas" into a tank, where they melt and are arrested as water, the operation being continuous and automatic. The carburetted air is rated at one-half of the heating value of coal gas. The results of practically working the machine are reported to be as follows: Petroleum of ·71 specific gravity makes "gas" at the rate of 2½ gallons per 1000 cubic feet, equal to one-half the same bulk of coal gas. With Welsbach incandescent lamps, 1000 cubic feet of this "gas" supply 40 burners of 80-candle power. The process is the joint invention of Mr. E. P. Reichhelm and Mr. G. Machlet, junr., of New York. It is rather remarkable that the inventors of this particular American air-gas machine, which strongly resembles something that has been introduced into this country by Mr. Stringfellow, insist that the removal of moisture from the air is essential for the due carrying of vaporized oil, which is in direct contrariety to Mr. Stringfellow's idea.

The Action of Carbonic Oxide upon Iron.

Quite recently Messrs. Mond and Quincke discovered that nickel combines with carbon monoxide to form a nickel-carbon-oxide, which promises to be useful in connection with the development of nickel plating. At that time the experimentalists failed to obtain any similar compound of carbon monoxide with another metal. Considering it strange that nickel should be the only metal capable of entering into combination with this particular gas, they persisted in their investigation, more especially with iron, under very varied conditions; and they have at last succeeded in demonstrating the fact that iron is volatilizable, although apparently in very small quantities, in a current of carbonic oxide. This result was communicated to the Chemical Society; and the particulars of Messrs. Mond and Quincke's experiments are reported in the "Journal" of the Society. Suffice it to note here that they volatilized some finely-divided iron in a current of carbonic oxide at ordinary temperatures; the deposits from this process giving all the known reactions of iron in remarkably brilliant colours. The practical importance of this discovery may or may not be considerable, as further research will be needed to establish the conditions under which the action can take place. It is perhaps possible that this newly-ascertained power of carbonic oxide upon iron may account in some measure for the action of coal gas upon cast-iron main and wrought-iron services in the course of years.

Distributed Petroleum Lighting.

The idea of distributing petroleum for lighting purposes in pipes, from a central reservoir, is not now a novelty; but the obvious practical difficulties of regulating supply to demand have hitherto stood in the way of its realization upon anything like a large scale. The greatest of these obstacles to success are claimed to have been removed by the Penn's Lamp and Lighting Company, who have a gravitation system of oil distribution which is stated to meet all requirements for such lighting as that of railway stations, public buildings, &c., in localities remote from gas-works. The key to success is a special form of float and regulating-valve in connection with every lamp, by means of which a constant level is maintained in the lamp reservoirs, with the result that the lamp burns steadily. The system is in operation at Cuxton Station, on the South-Eastern Railway; the supply-tank being fixed at a height of 23 feet above the level of the platform, from which service-pipes descend below the metals and rise to every lamp-column, bracket, and pendant. By means of small flash-lights, the lamps can be lighted and extinguished without trimming the wick except at long intervals, and the wicks can be raised and lowered from a distance. A second improvement consists of an addition to the present style of burner, by which the "intermediate" class of burning oils are rendered available for illuminating purposes by being fed to the wick at the top instead of requiring to be drawn up by capillary attraction. This is regarded as a peculiarly safe plan of lighting by oil. In case of fire, however, a system of lighting which entails the flow of oil by gravitation into a building would appear to present inconveniences such as insurance offices might regard as very serious.

Solidified Petroleum Candles.

Attempts have been made to manufacture candles of standard quality from solidified naphtha; but without success, according to a communication of M. Rudnitzky, of St. Petersburg, to *Dingler's Journal*. The preparation of these candles is based

on the fact that petroleum, by the addition of a little fatty acid, becomes a gelatinous body. The petroleum candles latterly made have consisted essentially of a mixture of ammoniacal soap, stearic acid, and petroleum. M. Rudnitzky says that the candle-mass can be prepared in two different ways, either by boiling together, with strong agitation, a determined quantity of petroleum, fatty acid, aqueous solution of ammonia, and certain ammoniacal salts; or by directing a current of ammoniacal gas into a solution of fatty acids in petroleum, adding water, and agitating as before. The properties of the product vary not merely with the proportions of the quantities of ingredients used, but also with the temperature of the boiler, the duration of the operation, and even the material of the boiler itself. Candles thus made have the great inconvenience of smelling badly of petroleum while burning; and their colour is not good. One month after their manufacture these candles show a composition by analysis of 10 to 12 per cent. of petroleum; 82 to 85 per cent. of stearic acid; 4·5 to 5 per cent. of water; and from 0·6 to 0·75 per cent. of ammonia. They lose petroleum rapidly. Photometrical tests of them are troublesome to make on account of their smoky, vacillating flame, with much separation of carbon on the wick. The illuminating value of a candle of this kind (eight to a kilogramme) was found equal to 1·05 of the normal candle, with a consumption of 10·5 grammes per hour.

TECHNICAL RECORD.

WESTERN (U.S.A.) GAS ASSOCIATION.

The Annual Meeting of this Association was held at Louisville (Kentucky) during the third week of May; and a summary of the proceedings on the earlier days appeared in the last volume of the JOURNAL, pp. 1254 and 1314.

The next paper read was one entitled "Gas-Engines—Some Practical Results and Comparisons." The author, Mr. E. H. Jenkins, of Columbus, Georgia, had made special efforts in his district in the way of introducing gas-engines; and these had been so far successful as to secure a consumption equivalent to no less than 8 per cent. of his total output—showing that the engine department would, if properly cultivated, prove a great help towards obtaining a good day consumption. Taking gas at the current price of 5s. 3d. per 1000 cubic feet, and coal, oil, &c., also at current rates, he showed that the cost of working a 4-horse power steam-engine for a month of 26 working days of 10 hours per day would be a little over 30s. per horse power; whereas a gas-engine could be worked for a similar period for about 20s. per horse power. A 7-horse power steam-engine worked for a month as above, would cost 26s. per horse power; but of two gas-engines of similar power, one cost 16s., and the other 15s. per horse power. These were results from actual practical working; and had the demand for power been intermittent, instead of regular, the advantage would have been still more in favour of the gas-engine. Attention was then directed to the question of steam *versus* gas for working electric light plant belonging to gas companies. A 50-horse power steam plant, working 12 hours, cost £1 16s. 6d.; but a battery of two 20-horse power and one 10-horse power gas-engines—which was preferred to a single gas-engine as enabling the power to be regulated according to the demand—was £1 7s. 2d. With a 100-horse power plant, the advantage of the gas-engines was about the same. In these estimates, gas was taken at a cost price of 2s. 1d. per 1000 cubic feet; and no charge was included for the purchase of water. Of course, some could produce steam cheaper by using breeze, and other refuse fuel; but even then it was worth while to pause and examine the advantages offered by the gas-engines. Mr. Jenkins also believed that gas-engines were cheaper than electric motors. The average cost of gas for a small ¼-horse power gas-engine was 32s. 6d. per month; whereas electric companies charged from 33s. 4d. to 50s. for an electric motor of similar powers. With the gas-engine, the consumer paid for no more than he used; but with the other he had to pay in any case. As to water-motors, gas-engines could be run at one-third to one-fourth the cost. A great obstacle was the first cost of gas-engines, which at present ranged considerably higher than either steam-engines with boilers, or electric-motors of similar power. With gas at 5s. 3d. per 1000 cubic feet, or less, a little persistent effort would lead to the introduction of gas-engines. In the course of the discussion that followed, Mr. Jenkins's figures were criticized by Mr. Boardman and others.

A paper on "The Removal of Ammonia from Gas," by Mr. K. M. Mitchell, of St. Joseph, Mo., was then read. In reviewing the various forms of washing and scrubbing apparatus, the author expressed a strong preference for the rotary washer-scrubber. At the same time, the tower scrubber was, he said, a useful adjunct; and at his own works the gas went from the condenser to a tower scrubber and then to a rotary washer. In the scrubber, liquor was pumped over and over again, continuously; and the advantage of this appliance was shown by the fact that, when it was in use, he purified 8000 cubic feet of gas per bushel of quicklime used, but without it only 6500 cubic feet. He described a form of separating tank, in which the tar outlet pipe consisted of a vertical pipe reaching nearly to the bottom of the tank, having a horizontal outlet placed an inch or so lower than the liquor overflow. The tank could be of brick or iron; and the whole was readily got at when the cover was taken off. He obtained about 40 gallons of 6-oz. liquor per ton of coal. He advocated the use of concentrating apparatus, by means of which the 40 gallons of 6-oz. liquor could be reduced to 3¼ gallons of 80-oz. strength. By this means, some companies had been able to secure contracts for their liquor on the terms of 6d. per ton of coal carbonized.

The President having invited discussion, Mr. James Somerville remarked that at any works large enough to run a sulphate plant, the returns from liquor should be more like 1s. 3d. per ton of coal. This was what he had done for the last 8 years; and there was no reason why others could not do the same. It had been urged that the sulphate works were a cause of nuisance; but he had been able to conduct his plant without complaint, though situated in a populous district. He took exception to the statement that a rotary washer required no more power than a tower scrubber; and he also thought that the separating arrangement described would not act well. He preferred to allow the tar to settle by gravity. He only used a tower scrubber; and his yield was 5¼ lbs. of ammonia, equal to 21 lbs. of sulphate, per ton of coal. He also warned the meeting against the use of water or liquor that was to any important extent colder than the gas, and spoke of the importance of keeping tar out of the scrubber. Mr. Thomas said that he had made 32 gallons of 10-oz. liquor per ton of coal, and sold the liquor at 1s. 1½d. per ton of coal carbonized.

Mr. E. Lindsley, of Cleveland, Ohio, followed with a paper on "Municipal Control as an Economic Factor." He dwelt on the advantages that would follow if the whole of the street operations—such as laying gas mains, water mains, sewers, &c.—were under one control, instead of being carried out by distinct companies, who did not consider each other's interests or that of the public. How frequently gas and water pipes were disturbed by sewerage works laid at a lower level. His idea seemed to be the appointment of a street surveyor, who should superintend the whole of the underground operations, and be responsible for injuries caused to existing mains, &c., by subsequent excavations.

In the course of the discussion, both the President and Mr. Thompson described the practice at St. Louis, where the town authorities exercised a degree of supervision that practically secured the control advocated in the paper. Sometimes the whole of the spoil had to be carted away, and the excavation refilled with more suitable material, and the surface always had to be made as good as it had been previously.

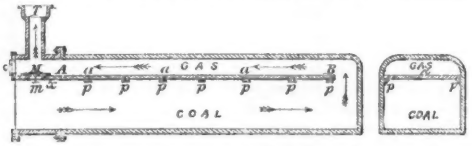
A discussion on the forms of gas companies' accounts, which had been drawn up by a Committee appointed at the last meeting, was then held; a copy of the form decided on having been sent to each member. It included a carbonizing book, with additional columns showing quantity of purifying materials used, changes of purifiers, make and sale of coke, tar, and liquor, and particulars of public lamps; a number of monthly summaries, based on the totals in the foregoing book, a page of which was arranged to serve for one month; particulars of meters and stoves bought, sold, or in stock; and an ordinary revenue account, with statistics as to cost per 1000 cubic feet of gas sold. Mr. Broadman considered the accounts very complete for coal gas-works, but would like to see columns added for the use of those who had a water gas annex. He agreed as to the importance of a uniform system being observed; and he thought that, with the additions he had indicated, the form before the meeting was well suited to that purpose. Mr. Slater questioned the possibility of arriving at a form suited to every member's requirements; and he thought the one proposed included a lot of unnecessary detail. Mr. Thompson thought that the meter account should also include particulars of the various sizes of meters. An accurate account of the meters bought, sold, let out, and condemned, should be kept. Mr. Jenkins submitted for inspection a simple form of account, suited to the requirements of very small works. The President thought that the form of accounts proposed formed a good model, to which additions or omissions of detail might be made, according to the size of the works. After further discussion, it was agreed that the form should be adopted by the members, subject to further revision if a few years' working rendered it necessary.

The meeting then closed, after the usual votes of thanks.

A Valuable Cannel Seam in North Wales.—A seam of cannel, which promises to prove very valuable, has lately been discovered at the Leeswood Valley Colliery, at Pontybodkin, near Mold, North Wales, the proprietors of which are Messrs. S. Chandler and Sons (Messrs. Kirkham, Hulett, and Chandler, Limited), of Palace Chambers, Westminster. On its discovery, the owners were immediately apprised of the fact, and at once repaired to Pontybodkin, when the seam was driven through in their presence, as well as in that of several engineers and colliery managers of the neighbourhood. Last Saturday week, in the company of a select party of gentlemen, Messrs. Chandler cut the first sod of the new shaft which is to be forthwith sunk. The results of analyses made of the cannel by Mr. J. Methven, Assoc. M. Inst. C.E., go to show that it possesses a high percentage of volatile matter, produces a coke of very superior quality, and is eminently suitable for mixing.

BREMOND'S PROCESS FOR THE DISTILLATION OF COAL.

M. Lucien Brémond, of Paris, whose name is familiar to many of our readers in connection with his exhaustive experiments on the naphthalene problem, has devised a process for the distillation of coal for gas making, which, he claims, is attended with special advantages. It consists in employing a retort of the form shown in the accompanying illustration.



As will be seen, the retort is furnished with a partition A B, extending almost to the back. This is formed with pieces of fire-clay *a*, supported by shoulders *p*, cast on the walls of the retort; or, if preferred, it may be made in one piece with the retort. The effect of this partition is that the gas produced by the first part of the charge—that lying at the back of the retort—is the first to pass away; the gas from the coal near the mouthpiece travelling the whole length of the retort, and, rising through the opening at the end, flowing back through the space between the partition and the top, as shown by the arrows. The mouthpiece is provided with an opening for clearing away the accumulated soot, which falls into the retort. Another opening M allows of the clearing of the ascension-pipe T. The latter opening is shown covered with the iron lid *m*; but this runs in a groove at *x*, and is easily moveable with the shovel. By taking off this plate, distillation can be carried on in the usual way, if it is desired to discontinue working by the new system. This allows of a comparison of the two methods being easily made.

The advantages claimed by M. Brémond for his arrangement are as follows: Less clinker in the retort, with a consequent increase in the quantity and illuminating power of the gas produced; economy of fuel used for heating purposes; and distillation of the tarry vapours. During the operations of charging and drawing the retort, the ascension-pipe is closed, and obstructions are thus obviated. The system possesses other advantages which, its author thinks, will make themselves apparent to gas engineers when it is put into practical application.

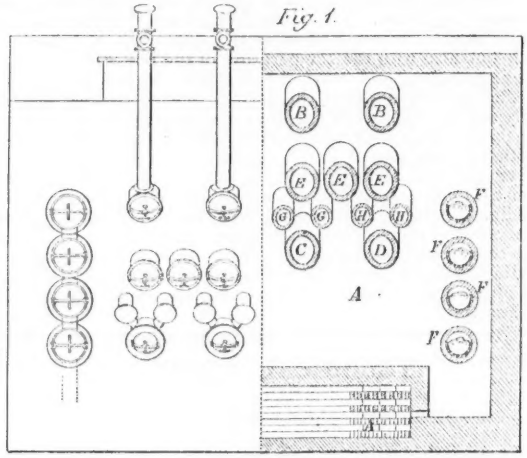
An Improvement in Boilers.—An invention of some importance to the users of steam has been patented by Mr. B. H. Thwaite, of Liverpool, and is being introduced as an improvement for Cornish and Lancashire boilers. The apparatus is styled a "saddle circulator;" and the effect of its use is stated to promote an active circulation of the water in the boiler—maintaining the plates at an even temperature all over, preventing straining and "weeping," resisting the deposit of scale on the flues, and promoting the generation of steam. The circulator is made of cast-iron plates, bent into conformity with the boiler flues. Placed on the upper half of the flues, at a distance of about 2 inches from the flue plates, it is semicircular or saddle-shaped; the circulator plates being bolted at the top to a partition plate, which is cast to bend over on either side. In this way a channel is left between the flue plates and the circulator, and the water in this space becoming rapidly heated, ascends, and flows out on either side of the partition plates in a cascade. Cold water from below rushes in to replace it; and thus the whole of the water is kept in motion. The saddle plates are made in widths of 12 inches each, so that they can be passed through the manhole and placed on the flue plates of any ordinary Cornish or Lancashire boiler.

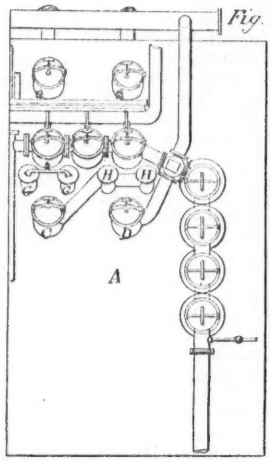
North British Association of Gas Managers.—The thirtieth annual general meeting of this Association will be held in the Victoria Hall, Waterloo Place, Edinburgh, on Thursday and Friday, the 23rd and 24th inst., under the presidency of Mr. R. Robertson, of Bathgate. The business will, as usual, be confined to the first day; the second being devoted to an excursion. After the disposal of the ordinary routine matters, and the delivery of the President's address, the papers, of which there are five on the programme issued by the Secretary (Mr. R. S. Carlow, of Arbroath), will be read and discussed. Mr. G. R. Hislop, of Paisley, will describe a new form of burner specially adapted for gas-testing purposes; Mr. J. West, of Manchester, will deal with the subject of labour-saving appliances in connection with unloading, breaking, and conveying coal and cannel, and machinery for charging and drawing gas-retorts; Mr. G. Love, of Paisley, will recount some experience in the construction and working of regenerative retort-settings; Mr. D. Robertson, of Dunoon, will have something further to say on the old subject of unaccounted-for gas; and Mr. D. Macfie, of Edinburgh, will take up the lighting of large interiors by means of regenerative gas-lamps. The question-box will again be available for the use of members who desire to obtain information on any subject relating to the manufacture and distribution of gas. In the course of the day, a report will be submitted by the Sub-Committee of the Murdoch Memorial Fund. At the close of the proceedings, the members will dine together in the Waterloo Hotel; and on the following day there will be an excursion to Roslin Chapel and Castle.

REGISTER OF PATENTS.

Manufacture of Lighting and Heating Gas.—Walker, E. W., of Chancery Lane, London. No. 8373; May 30, 1890. [8d.]

This invention relates to the manufacture of gas for lighting and heating by combining ordinary coal gas and water gas, or ordinary coal gas and water gas and hydrogen.





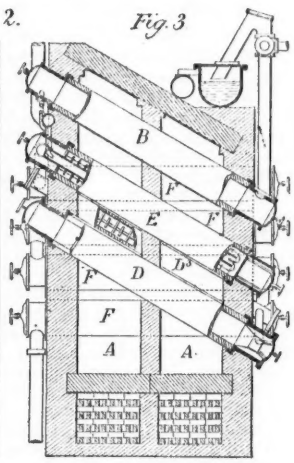


Fig. 1 is a partial front elevation and partial longitudinal section of the apparatus. Fig. 2 is a back elevation of half of fig. 1. Fig. 3 is a transverse section of fig. 1.

The retorts in which the coal gas and water gas are produced are set in a furnace A, by which heat is applied externally. The coal gas is led off from the retorts B, and passed into a hydraulic main, condenser, and washer, by which the tar and aqueous vapours and part of the ammonia are removed; and then it is sent into carburetters E, into which also the water gas is passed. It is preferred to use inclined or vertical retorts rather than horizontal ones, to facilitate charging and discharging. Before withdrawing the hot coke from the coal-gas retorts, steam may be admitted, to keep the retorts free from deposited carbon. This, says the patentee, would increase the quantity of sulphur and ammonia in the gas; but "this increase of sulphur is not objectionable in this process, as the total sulphur (less what is contained in the gas used in firing the furnace) has to be removed from the gas before storing in the holder." If, however, the sulphur should prove objectionable, the pipes leading from the coal-gas retorts to the hydraulic main may be closed by a valve before the steam is passed through the hot coke; and then the sulphur, &c., produced by the steam may be discharged elsewhere and not allowed to mix with the coal gas at all.

The hot coke withdrawn from the retorts may be placed in the retorts or chambers C and D (used as water-gas producers), to which superheated steam is admitted for forming water gas. These retorts may be in batteries of two, in the first of which C the steam is decomposed, forming an imperfect water gas, principally carbonic acid and hydrogen. This imperfect water gas may be passed through the second water-gas retort D, where the carbonic acid is converted into carbonic oxide. The imperfect water gas produced in the first retort may, if desired, be superheated before being passed into the second one. The retorts may be placed, for example, four in a bench, and be worked in pairs. These retorts may each have in connection with them two or more smaller fire-clay retorts or pipes G H, fitted with baffling-plates of fire-clay, porcelain, or other suitable material, to increase their efficiency, for the purpose of superheating first the steam used in the first retort, and secondly the imperfect water gas produced therein, previous to its passage into the second retort, where it is converted into a perfect water gas.

The inventor prefers to make water gas in two operations, because the superheated steam is decomposed at a much lower temperature than the carbonic acid; and the latter being subsequently superheated, facilitates its conversion into carbonic oxide.

All the retorts or chambers B, C, and D, and superheating retorts G and H, and also the carburetters E, may be arranged in a furnace of any convenient form; and the top ends of the inclined retorts may protrude through the back of the furnace A, the lower ends coming out through the front of the furnace A, as shown in fig 3, while the lower ends of the superheaters communicate with the lower ends of the water-gas producers C and D. The carburetters E (three or more) are preferably fitted with baffle-plates of fire-clay or other suitable material, to increase their efficiency.

The coal gas produced in the first carbonization of the coal (which gas may be combined with hydrogen, as hereafter described) may be sent under pressure to the carburetters, where it may be divided into jets (one in the end of each of the carburetters) to help to draw the water gas from the retort D. The two gases will then mix together, and may be forced through a pipe in the centre of each of the carburetters E, and may be passed from the pipe, as shown by arrows, back to the ends of the carburetters at which they entered, coming in contact with the baffle-plates therein. The carburetting may be effected in stages—preferably three—in which case the total water gas with, say, about one-third of the coal gas produced in the first carbonization of the coal (which gas acts as a jet, being under a slight pressure from the exhauster) will be carburetted up to a certain point in the first carburetter; a sufficient quantity of hydrocarbon oil or tar being added for that purpose. Another third (more or less) of the gas, acting as a jet under a slight pressure from the exhauster, forces the gas through the second carburetter; additional hydrocarbon oil or tar being here added. The remaining portion, acting as a jet, forces the gas through the second carburetter; additional hydrocarbon oil or tar being added here also. The furnace A may (in addition to the retorts, superheaters, and carburetters already described) be fitted with fire-clay retorts F, containing spongy iron, to produce hydrogen by decomposition with steam. The spongy iron is supported on trays; and may be alternately oxidized by passing steam over or through it, by means of a valve (thus producing hydrogen), and then be reduced to a metallic state again by passing water gas over or through it, so as to avoid the necessity for removing the charge of iron. The hydrogen so produced is caused to mix with the coal gas as it issues from the coal-gas retort; the hydrogen absorbing some of the lighter hydrocarbons. The united gases pass together to the condensers and washers, and thence to the exhauster, which forces them into the carburetters E, where they mix with the water gas, and pass through the carburetters with it. The water gas used in the hydrogen producers F is taken from the water gas producers D already described, so as to reduce the quantity of water gas to be mixed with coal gas, but replacing it with hydrogen. By this means, it is claimed that the percentage of carbonic oxide in the finished gas may be reduced to almost any desired point.

Gas-Fires.—Mackinlay, R. W., and Darwin, H., of Glasgow. No. 9449. June 18, 1890. [8d.]

This invention, relating to heating appliances, has for its object to increase their general utility by making all the visible surfaces of the heat-arresting and refracting body of loose self-adjusting and removeable sections and parts. They are constructed of perforated domes or domed sections chiefly composed of metal, each united to and covering a duplicate part attached to the back or underside. The back part consists of porcelain, nickel, mica, composite metal, or other suitable material; and the perforated domes themselves are suspended in suitable positions "for being heated by means of lighted gas-jets into a glowing, incandescent, fiery mass, having a resemblance to a coal or coke fire."

Charging Inclined Gas-Retorts.—Van Vestraut, L., of Southall. No. 10,831; July 12, 1890. [8d.]

This invention refers to the charging of retorts for carbonizing with the required amount of coal in an even layer, when the retorts are built at an angle deviating from either the horizontal or vertical line.

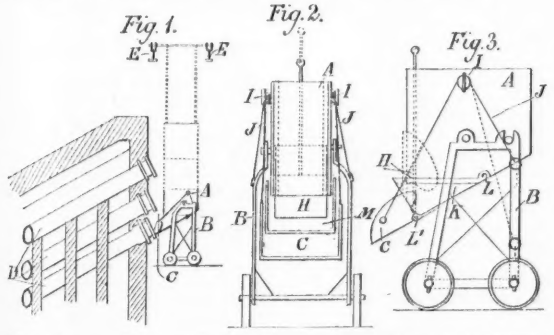


Fig. 1 is a vertical section showing the retorts D, with the hopper A on the carriage B delivering the material down the flap C into the mouth of the lower retort. Hoppers at various heights supported (from above) on rails E, or otherwise, are shown by dotted lines. Fig. 2 is a front elevation of the hopper and carriage. Fig. 3 is a side elevation.

The invention consists of a hopper A (of capacity equal to the total charge) in the form of a vertical tube, varied in width and length as necessary for the material and charge; the bottom end of the whole hopper being reduced to the width of the entrance to the retort. There is a falling bottom K hinged at L and L¹ (or at the back end only), the fall of which is adjustable by stops to be raised or lengthened by levers or the chains J over the pulleys I, as the angle of the bottom is required to vary the velocity of the issuing material. On the bottom K being dropped, the front of the hopper is opened by the flap C falling forward to engage with the entrance of the retort. It forms a continuation of the bottom of the hopper, and delivers the material from the hopper to the retort as it escapes from the bottom of the hopper. The flap C and bottom K are closed by chains J, and the ring on the ends is fastened on hooks in the frame, indicated by dotted lines in fig. 3. The front of the hopper has a slide H, which can be raised or lowered to control the rate of issue of material when the front is left open. In fig. 2, the mouth M is shown through which the material passes out into the retort.

The hopper is carried on a rectangular frame B run on wheels, or suspended on wheels from above as shown in fig. 1, and guided therein by chains, links, or bars, so as to be lifted or lowered to the heights of the respective retorts. The frame and hopper can be supported on a travelling frame on wheels above or below the front of the retort, so as to be moveable from the supply of material to the retort mouth.

When it is desired to charge a retort, the frame containing the hopper is filled with coal and wheeled to the front of the retort, after being adjusted to the desired height so as to allow the requisite velocity of the issuing coal to obtain an even distribution over the floor of the retort. This can be altered to suit the varying classes of material and the co-efficient of friction due to the material, the floor of the retort, and the inclination from the horizontal line, by increasing or decreasing the angle of the bottom of the hopper. The bottom K is then lowered, and the front delivery flap C opened. The issuing material is thus allowed to gravitate into the retort. The hopper is then withdrawn; the retort closed; and the bottom K and flap C readjusted.

Gas-Burners.—Tully, W., of Leytonstone, and Corbett, J., of Sydenham. No. 11,398; July 21, 1890. [8d.]

This invention relates to Argand gas-burners of the kind described in patent No. 10,675 of 1866, where there is a lower chamber or reservoir connected with a perforated annular chamber or Argand ring by a series of hollow pillars or tubes. Heretofore these burners have been built up of a number of parts secured together by screw-threads; consequently (apart from the cost of manufacture), by reason of the large number of joints required, great care must be taken in order to ensure tightness and prevent leakage.

The patentees therefore propose to dispense with joints in that part of the burner through which the gas flows, with the exception of the joint between the annular metal chamber of the burner and the perforated ring of steatite or other refractory material, when such a refractory ring is used. The burner would thus be constructed as follows: The lower chamber or reservoir of the burner, the annular chamber or Argand ring, or the metallic portion of the same, and the pillars connecting these parts are cast in one piece; the metallic part of the annular chamber or Argand ring being made solid, if desired, and afterwards bored or turned to form the required annular chamber or cavity. Holes are bored through the pillars which connect the annular chamber or Argand ring with the lower chamber or reservoir, The socket or taper nipple at the lower part of the burner is also formed integrally with the lower chamber or reservoir. Therefore there are no joints needed in the metallic portion through which the gas flows, as it consists of a single piece of metal.

Gas-Governors.—Sturgeon, T., of Ilkley. No. 11,673; July 25, 1890. [8d.]

In the first place, this invention relates to gas-governors in which a single valve is used; and it consists in so arranging the valve that the main pressure will not have any tendency either to shut or open the valve. For this purpose an annular valve is so employed that the main pressure comes upon it only in a sidelong direction, except at the portions where the valve necessarily projects; and these parts are so arranged that there will be the same area exposed to downward pressure as to upward pressure. The valve is thus practically an equilibrium valve.

One method of arranging the valve is as follows: There is a light float with a flange formed upon it, to which is attached a valve in the form of a light ring, the inner diameter of which is somewhat smaller than the inner diameter of the float. The valve-seating consists of a circular plate carried on the top of the outlet-pipe, which projects up concentric with the float and valve. This circular plate has a hole in its centre, which communicates with the interior of the outlet branch. The main casting carries the inlet and outlet branches, and is furnished with an annular trough for mercury, into which projects a thin ring carried on the underside of the valve. This ring being immersed a sufficient depth in the mercury, forms a gas-tight joint; while it allows the valve to rise and fall without friction. The valve having been put in its place, with the thin belt or ring projecting down into the mercury trough, the circular plate forming the seat is fixed on the top of the outlet-pipe. The float is then put on, and attached to the flange on the valve by screws round the outside; the joint being made gas tight. The interior of the ring on the valve above the level of the mercury is open to the gas supply, so that when the float is down, the gas can flow round the edge of the plate on to its upper side, and thence make its way down the outlet-pipe. But when the float rises (upon the proper pressure being attained), the valve is brought up against its seating on the circular plate, and this shuts off the further supply of gas from the main.

Another way of arranging the valve is as follows: The float is made without any flange, and its vertical walls dip into the mercury trough. In the centre of the float is carried a thin spindle, to which is attached a small valve, by preference consisting of a light casting, the upper side of which should be of the form of a cone or a portion of a sphere. Openings are cut through the upper portion of this valve round the centre, leaving a ring of sufficient width at the circumference to form the valve. The lower portion of the valve consists of a deep ring of thin metal, which dips into a small annular trough of mercury concentric with the float, so as to form a gas-tight joint. The seat against which the valve shuts is the inner edge of a stiff cast-metal ring, fixed gas tight on the main casting, after the valve is put in its place. The openings cut through the valve communicate with the interior of the outlet branch; and when the float is down, the gas can pass between the valve and its seat, and down the openings to the outlet-pipe. When the gas attains its proper pressure, the float rises, and draws the valve up against its seat, so as to shut off communication between the main gas supply and the openings in the valve. The two concentric troughs communicate with each other by means of a hole drilled through the

main casting; the hole being also in connection with a little branch, so that the mercury can be poured in after the governor is fixed in position, or through which it may be drawn off at any time that it may be necessary to remove the governor.

In the next place the invention consists in improvements in the gas-governor described in patent No. 6134 of 1889—governors with liquid valves. The inventor finds that, when it is desired to work with a very low pressure and a small quantity of gas, the surface of the liquid is brought into such close contact with the lower edge of the projecting rim as to cause an unsteadiness in the light owing to the bubbling of the gas through the liquid. To prevent this, he proposes to float upon the surface of the liquid a ring turned to a true face on its upper side. The lower edge of the projecting rim is also turned true; and it and the ring are ground together. The mercury forms a kind of flexible bed for the ring, and thus allows it to adjust itself to the edge of the projecting rim when shutting off the gas; and even when only a small quantity of gas is being used, it can pass without fluttering between the ring and the edge of the projecting rim.

Gas Motor Engines.—Richardson, J., and Norris, W., of Lincoln. No. 11,755; July 28, 1890. [8d.]

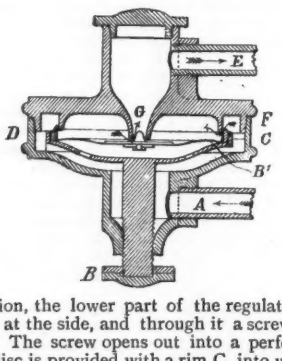
These improvements refer to the igniting, starting, governing, and exhaust-valve arrangements of gas motor engines, and are specially applicable to compression gas-engines acting on the "Beau de Rochas" or four-cycle principle.

The first part of the invention refers to the igniting devices, and is intended to meet a difficulty experienced in adjusting the time of ignition for different speeds, when slow-action igniters (such as the hot tube) are adopted. With a hot-tube igniter, utilizing a valve to open communication between the hot tube and the compressed explosive mixture, it is necessary to open the valve somewhat before the instant at which ignition is required—that is to say, it is necessary to give the valve a certain amount of "lead." When the engine is working at high speed, more lead is required than at low speed, in order to accomplish ignition at the proper time. In consequence of this, if the valve be adjusted to act properly at high speed, then at a low speed (such as is common when starting) the ignition will take place at too early a point, and so tend to back the piston, instead of driving it out, to cause normal revolution. To meet this difficulty, the patentees provide the igniting-valve with an adjustable connection, so that the lift or opening may be varied from (say) $\frac{3}{8}$ inch to $\frac{1}{16}$ inch. When the engine is being started, the lift is made (say) of the smaller degree; and when running at speed, it is increased to $\frac{3}{8}$ inch; and so by a simple contrivance, the time of ignition is arranged to suit both the low and high speeds.

The igniting-valve, opening communication to the hot tube, consists of a pin or spindle having two seats—one of which opens and closes the port leading to the hot tube, while the other forms a cushion, and is held hard against its face by the explosion, so as to prevent any exit of the gases under explosion pressure to the atmosphere. The connection between the actuating lever and the pin or spindle valve is so arranged that, should the explosion occur before the external seat is pressed home, the spindle yields without communicating any excessive pressure or strain to the lever. The connection between the lever and the pin valve is made yielding or elastic by means of springs. To reduce compression, so as to start easily by hand, the exhaust-valve cam-sleeve is provided with a quick-thread screw, and the sleeve is allowed to slide on a "feather." On the valve motion shaft is provided another sleeve with a screw, internal or external as required, to work on the first-mentioned screw; and this second sleeve has a disc or projection to enable it to be turned by hand. It is free to be rotated round the shaft, but is constrained longitudinally by means of a pin and groove or other device. When it is desired to reduce compression, in order to start, this sleeve is rotated by hand; and it pulls the ordinary cam off the roller on the exhaust-valve lever, and brings into action with the roller the starting cam, which is arranged to hold open the exhaust-valve for a longer period than usual.

Gas-Regulator.—Thorp, T., of Whitefield, Lancs., and Marsh, J. G., of Lytham. No. 2524; Feb. 12, 1891. [6d.]

This invention relates to frictionless "quantity" gas-regulators suitable for regenerative lamps and stoves where a constant flow of gas to the burners, under varying conditions of pressure in the mains, is required.



In the illustration, the lower part of the regulator casing is shown with a gas inlet A at the side, and through it a screw having a milled head B is fitted. The screw opens out into a perforated disc-shaped piece B1. This disc is provided with a rim C, into which a diaphragm of leather or its equivalent is secured at its outer edge by an inner rim D. On the upper side and in the centre of the diaphragm is a projecting piece of metal or its equivalent (of such a weight that a pressure of about 2-10ths of an inch of water is required to raise the diaphragm with attached projection). The upper part of the regulator casing has a gas outlet at E. F is a rim with which the upper part of the casing is provided, slightly smaller in diameter than the internal diameter of the rim, between which and the rim the gas passes on its way through the apparatus. G is an orifice, into which the projection enters when raised by the pressure of the gas.

When the apparatus is in action, and the gas is passing at any required rate between the limits the particular regulator is intended to be used with, any increase of pressure tends to raise the diaphragm and to force the projection into the orifice G, and so lessen the quantity passing. But as this extra pressure, together with the pressure due to the tending decrease of flow, are acting on the upper surface of the diaphragm also, there is very little tendency to a reduction in the flow; such remaining tendency being altogether eliminated by the form of the projection combined with the increasing pressure necessary to raise the diaphragm.

In order to adjust the apparatus to pass any required quantity between certain limits (which may be as much as 50 per cent. on either side of the mean), the diaphragm is raised or lowered *in situ* by turning the milled head B; the same action also closing or opening the annular space between the rims D and F, so as to increase or decrease the quantity at will.

Increasing the Effectiveness of Gas-Burners.—Cruikshank, G. M.; communicated from J. B. Untermarkt, of Gelnhausen, Germany. No. 7284; April 28, 1891. [4d.]

According to this invention, a metal plate is arranged over the opening of the burner in the plane of the flame. Its upper edge is straight or curved; while its lower edge may be straight, curved, or wedge-shaped. The plate is at its ends held in lugs made in a sleeve, which is slipped over and encases the upper part of the burner proper. The plate is intended to oppose a resistance to the out-streaming gas, whereby the rapidity of the discharge is diminished, and the lighting power of the flame increased.

The patentee says: It is a well known fact that in fishtail burners, a given quantity of gas will produce the best lighting effect when the pressure is lessened, and hence when the speed of the gas stream or jet is diminished. Experiments undertaken at the town gas-works of Carlsruhe proved that, with this invention, when the pressure of gas is 20 mm. with fishtail burners, the original lighting power is raised about 27 to 30 per cent., and with two-holed burners, about 103 to 114 per cent.

APPLICATIONS FOR LETTERS PATENT.

10,585.—Parkinson, J. H., "Improvements in utilizing the heat of steam, gas, or heat engines." June 22.

10,667.—Fanta, F., "A new self-acting apparatus for the automatic production of oxygen." June 23.

10,752.—Grondal, G., "Improved regenerative gas-furnace." June 24.

10,858.—Cutler, S., "Improvements in shear-legs or apparatus for raising tall and heavy structures, especially applicable to the erection of gasholder columns." June 25.

10,866.—Jones, F. J., "An improvement in furnaces for re-heating gases used in coke making." June 25.

10,887.—Walker, J., and Hampshire, J., "An apparatus for lighting by electricity large numbers of gas-burners simultaneously and cheaply, as compared with existing methods." June 26.

10,902.—Braidwood, J. F., "Improvements in apparatus for charging retorts for the manufacture of gas and for other like purposes." June 26.

10,918.—Chandler, J. C., "Improvements in apparatus for washing or scrubbing gas." June 26.

10,995.—Hart, W. F., "Improvements in or relating to elevators and conveyors for use in loading, unloading, and transferring coal, grain, and the like." A communication from C. J. Seymour. June 27.

11,001.—Wallwork, R., and Wells, A. C., "Improvements in or applicable to self-generating gas or vapour burners." June 27.

11,069.—Rhodes, S. G., "Improvements in or in connection with the burners of gas fires and stoves." June 30.

11,094.—Goehde, R., "Improvements in apparatus for use in cooking by the aid of gas." June 30.

11,111.—Stigler, A., "Improvements in or connected with gas engines or motors." June 30.

11,132.—Irgens, P. H., "Improvements in and relating to gas or petroleum engines or motors." June 30.

11,138.—Pinkney, C. W., "Improvements in or connected with engines worked by gas generated from petroleum or other liquid hydrocarbon." June 30.

11,158.—Parr, C. J., "Self-regulating gas-burner." July 1.

11,210.—Armour, L. H., "Improvements connected with ovens, furnaces, retorts, or other structures used in the making of coke or charcoal, or for distilling or roasting carbonaceous matter, or otherwise subjecting carbonaceous matter to the action of heat." July 1.

11,293.—Claremont, E. A., "Improvements in exhaust and silencing boxes or pipes for gas-engines and other like apparatus." July 3.

11,347.—Hodgson, J., and Myland, W., "Improvements in gas lighting." July 3.

11,416.—Bromilow, J., "Improvements in gas-producers." July 4.

The Price of Gas at Haworth.—At the monthly meeting of the Haworth Local Board last Tuesday, Mr. Ackroyd moved that the price of gas should be reduced from 4s. 6d. to 4s. 3d. per 1000 cubic feet in the outside districts, and from 4s. to 3s. 6d. in the Haworth district. The consumption of gas throughout the entire district had, he said, been reduced from 16 million to 12 million cubic feet, showing that the inhabitants must have restricted their consumption. He believed the reduction in price would induce their old consumers to again burn gas; and by encouraging a freer consumption, the loss would be reduced. The Clerk pointed out that, by their parliamentary powers, the Board were restricted from charging the Stanbury district a greater sum than 6d. in excess of the price charged in Haworth. Mr. Ackroyd said in that case he would move that the price be reduced from 4s. 6d. to 4s. per 1000 cubic feet in the outside area, and from 4s. to 3s. 6d. in the Haworth district. Mr. Harper seconded the resolution, which was carried.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

The Enrichment of Coal Gas by Liquid Hydrocarbons.

SIR,—My attention has been called to a letter in the JOURNAL for the 30th ult., from Mr. B. H. Thwaite, of Liverpool, in which he says I must surely be in error in placing the cannel enrichment at the head of the list, as the most expensive method. My figures were taken from a paper read by Mr. Frank Livesey before the Southern District Association of Gas Engineers and Managers last autumn; and as I presume his experience in the use of cannel coal is probably as great as any that could be found, I think I am quite safe in adopting his figures and assuming that the enrichment of the 16-candle gas up to 17¼-candle power by the use of cannel coal would cost 4d. per 1000 cubic feet.

In the same letter, Mr. Thwaite holds out hopes of his giving us the results of the working of his generator at Southall, in an exhaustive memoir, which will undoubtedly be a valuable contribution to our knowledge of the subject. But I think he is hardly justified in taking the figures given by Mr. Goulden, obtained by the use of the distillate oil used at Beckton, and applying them to the Novorossisk oil used in the Southall plant, as I think he will find that the two oils do not give the same results.

In my paper read at the Carlisle meeting of The Gas Institute, and reported in the JOURNAL for the 16th ult. (p. 1181), there is an error in the calculation from Dr. Thorne's figures as to the cost of enrichment by the Tatham process, which should come out as 0·5d. instead of 0·1d. as given.

VIVIAN B. LEWES.

Royal Naval College, Greenwich, S.E., July 10, 1891.

SIR,—From my letter published in your issue of the 30th of June I take the following extracts: "At the present time we have two of the enrichers fixed for the South Metropolitan Gas Company, London, enriching the gas on the inlet of the meter, before the gas goes into the holders;" and "some are also fixed on the outlet to the consumers. At The Gaslight and Coke Company's works *one* of the enrichers is fixed on both the inlet to the gasholders and the outlet to consumers." Mr. Valon, in his letter published in your issue of the 7th inst., asks the question, Why fix an enricher at the outlet as well as at the inlet? My reply is that at The Gaslight and Coke Company's works referred to—with a storeage capacity sufficient to supply the consumers of an ordinary-sized gas company for about three months—a very large proportion of the gas is manufactured at another works miles away; and on some occasions it has to be stored for a considerable time, and, from the fact of its being of an unknown quality, it is considered essential that some means should be provided for enriching the gas when necessary to keep it up to the London standard quality as it leaves the works to the consumers.

After a long experience in the manufacture and enriching of coal and other gases, I maintain that the most economical and efficient way of enriching coal gas is as it leaves the works to the consumers—not because any part of the enrichment is lost by putting the gas into gasholders, but because the illuminating power can be regulated so as to be able to satisfy the requirements of the London County Council or other authority, without giving a too-high and extravagant quality.

FRANK W. CLARK, Engineer,
Gas Lighting Improvement Company, Limited.

Suffolk House, Laurence Pountney Hill, E.C., July 13, 1891.

Mr. Walmisley's Gas Institute Paper.

SIR,—I trust no one will think I desired to charge Mr. Walmisley with any want of knowledge, either of the elementary or higher principles of construction; such is not my wont. I sincerely thought Mr. Walmisley would be very glad of an opportunity to correct an impression which his words conveyed, and which I believe he said under a misapprehension of my own meaning probably. He will scarcely have forgotten the various after-conversations which took place.

It would seem that Mr. Walmisley now thinks that in a *badly fitting* cup and grip, the hammering action can to some extent result. As this is a purely mechanical question, it would be interesting to see how it could be physically accomplished. Bad work, such as described, would doubtless be an evil, resulting in an improper distribution of strains; but it certainly would not produce the hammering action detailed, unless the non-fitting portions were also partially free of the main structure—that is to say, loose. The pressure of the gas, lifting the whole, renders the two lifts practically rigidly connected when the weight of the outer lift is carried by the inner lift, as already described, and as is perfectly familiar, I should say, to every gas engineer in the world.

W. GADD, C.E., F.R.M.S.

Manchester, July 8, 1891.

The Scarcity of Water in the Rhondda.—At the Glamorganshire Quarter Sessions last Thursday week, the Ystrad Gas and Water Company appealed against their conviction by the Rhondda Magistrates for giving an insufficient supply of water in January last to a cottage at Clydach, as reported in the JOURNAL for April 7 (p. 659). Similar evidence to that adduced on the previous occasion was given; and in the end, the Court upheld the decision of the Magistrates, and declined to grant a case.

The Extension of the Shipley Water-Works.—The scheme of water-works extension upon which the Shipley Local Board are about to expend a sum of £10,000, with a view of improving the high-level supply, was formally inaugurated last Wednesday afternoon, when the ceremony of turning the first sod was duly carried out on the site of the proposed filter-beds at Eldwick, by the Chairman of the Water Committee (Mr. M. Hardaker), who was presented by the Engineers —Messrs. W. B. Woodhead and Son—with a silver spade.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Bills last week:—

Bill read the first time; Local Government Provisional Orders Bill, No. 14 [Salford Order].

Bill read the third time: Clevedon Local Board Bill.

HOUSE OF COMMONS.

The following progress was made with Bills last week:—

Bills reported: Alloa Water Bill; Gas and Water Provisional Orders Confirmation Bill.

Bill reported, read the third time, and passed: Local Government Provisional Orders Bill, No. 14 [Salford Order].

Bills read the third time and passed: Bristol Gas Bill; Gas and Water Provisional Orders Confirmation Bill; Newark Corporation Bill.

Bill withdrawn: Troon Water Bill.

HOUSE OF COMMONS COMMITTEE.

Tuesday, June 23.

(*Before Sir* STAFFORD NORTHCOTE, *Chairman*; *Mr.* FOLJAMBE, *Captain* BOWLES, *and Mr.* E. KNATCHBULL-HUGESSEN.)

BRISTOL GAS BILL.

This Bill came before the above Committee to-day. The powers sought by the promoters were fully set forth in the report of the proceedings published in the JOURNAL when the Bill was before the House of Lords Committee in March last.* The greater part of the speeches of Counsel and of the evidence on the present occasion was also covered by that report; and therefore it is only necessary to give a brief outline of what took place.

Mr. BALFOUR BROWNE, Q.C., and Mr. ERSKINE POLLOCK appeared on behalf of the promoters; Mr. PEMBROKE STEPHENS, Q.C., and Mr. MOON for the Bristol Corporation, who petitioned against the Bill.

Mr. BALFOUR BROWNE, in opening the case for the promoters, said that the authorized capital of the Company was equal to £511,250. They had raised £444,250; and they had still unissued £67,000. The premiums upon the £444,250 amounted to £210,415; and all this had gone into capital, and bore no dividend. The result was that, while upon the £444,250 they were entitled to pay 10 per cent., on the capital and premium together they were only distributing £6 7s. per cent. This did not appear to be generally understood; and the 10 per cent. dividend led to some discontent among the public. It was therefore proposed by the promoters to change every £100 of the stock into £200 of 5 per cent. stock, which would double the nominal amount of the capital. The Corporation in the other House said something about the disadvantage of this process, if they were going to purchase the works; but his learned friend (Mr. Moon) practically gave up the point. The promoters were not proposing by the doubling of the capital to have too large a reserve fund, but just sufficient to enable them to raise the capital at a premium. The reserve fund was at present exceedingly small, because of the fact that the Company had all along raised their money under the auction clauses. If they had raised it in the ordinary way—by distributing the shares among the shareholders—the reserve fund would have been one-tenth of £654,000; this being the total amount spent on the works. But as a fact, it was only upon £444,250. With regard to the borrowing powers in the Bill, it used to be invariable that gas companies were only allowed to borrow one-fourth of their capital; leaving three-fourths as a security for the lenders of money. However, gas-works were now so well established that it was found this security was not absolutely necessary; and it was a clear advantage to the gas consumers that as much money as possible should be borrowed, seeing that they could borrow at from 3 to 3¾ per cent. Their proposal was that they should be permitted to borrow one-third of the whole capital; and that they should have a reserve fund in proportion to the total amount of stock. As to the question of illuminating power, he thought it was a little hard that the Corporation should come again and talk about it being too low; inasmuch as in the other House it was agreed that it should be 15 candles at the works and 14¼ candles at the testing-place.

Evidence was then called in support of the Bill.

Mr. *J. W. S. Dix*, the Chairman of the Company, examined as to the proposal to convert each £100 of capital into £200 of 5 per cent. stock, said there was a general impression throughout the city and among the Company's workmen that they were paying a dividend of 10 per cent.; and this very fact was one of the great inducements that led to a strike at the gas-works in 1889. Many holders of stock who had bought in the open market since 1853 were only receiving £5 1s. 6d. per cent. If the Local Authority wished to purchase the works, they would not do so upon the capital, but upon the revenue; but he did not think the Bristol Corporation had ever had the slightest idea of buying the Company's concern. In the case of other companies, they found that the lower the price of the stock, the better it was dealt with; and he believed they would be able to issue the remaining capital (£67,000) on better terms for the Company, and therefore better for the consumer. As to the reserve fund, it would give advantage and solidity to the Company to have a good one, and would enable them to borrow any money they might require at much less interest than they would otherwise do. If this proposal had been made a few years ago, the chances were that they might have been able from the reserve fund to tide over both the strike and the rise in the price of coal, and at the same time not have increased the price of gas to the consumers, as they had been obliged to do. They had a precedent in the West Ham case for

* See JOURNAL, Vol. LVII. p. 499.

the proposal to increase the proportion of the debentures from one-fourth to one-third of the total share capital. It was not likely that they would rush into any speculative transactions as to selling gas in bulk. He certainly thought that the question of illuminating power was settled when they were before the Lords Committee; and with regard to the price of gas, although they were entitled to 4s. 6d. per 1000 cubic feet, they only charged 2s. 10d.

In cross-examination, witness said that in 1884 he was the moving spirit in proceedings which resulted in an application before the Recorder in order to show that the price the Company were charging the consumers was higher than it should be. He was at the time a member of the Corporation and the Sanitary Authority; but was not a Director of the Company. Those proceedings resulted in a reduction being made. The object of the Bill was really to utilize the capital in the concern in the most economical way. They wanted more money, and must go for further capital if they did not get the present Bill; but as they had the capital in the undertaking, it had occurred to them that they could raise it by the economical means proposed. The Directors were anticipating spending at least from £100,000 to £200,000 upon new works, in order to meet the increasing demands made upon them; but as yet no definite estimate had been made. They had still £67,000 unissued, which, at the present market price, would produce something like £134,000, or more. Their reserve fund was not full; he believed at the end of last year it stood at about £43,000. In 1889 they had to withdraw from it something like £10,000; and to enable the Directors to meet their obligations, they were afterwards obliged to raise the price of gas. He admitted that they carried forward a balance of £7000 at the end of last year; but they had very heavy renewals to pay for in the present year. If the £7000 were added to the reserve fund, it would make it £50,000, and another £1000 would be required to bring the fund to the full amount. Of course, if the reserve fund stood at its maximum, and the Company made a profit over and above sufficient to pay 10 per cent., the consumers would be entitled by law to a reduction.

Mr. *J. V. Green*, the Secretary of the Company, said he thought it was advisable that the name of the Company should be changed as proposed by the Bill to the "Bristol Gas Company." The price of gas was now 2s. 10d. to ordinary consumers; and 2s. 8d. to large ones. At different times it had been as low as 2s. 2d. for private consumption, and 1s. 10½d. for the public lighting. The increase in the cost of coal and labour had, to a considerable extent, caused the rise in price. Regarding the debenture capital, it stood at present at £130,750. This had been issued at 4 per cent.; but they had recently disposed of it by auction at about £110, which rather reduced the rate of interest. They had only recently issued debenture stock in this way; and they did it voluntarily. On the actual capital raised, the sum required for dividend at the present time was £44,000; and the doubling of the existing amount of capital would not in any way change this figure. As to the illuminating power, if they had to give 15 candles at the works, they would have to produce gas of more than 16-candle power. He found that out of 383 gas companies dealt with in the Board of Trade returns, only 29 were required by statute to give an illuminating power in excess of 15 candles. In 1889 they employed Messrs. Sugg and Co. to put up new testing apparatus at their works; and since then they had been satisfied with the results which they obtained. Respecting the reserve fund, it was at present considerably smaller, in proportion to the capital, than that of other gas companies throughout the kingdom; and, of course, this proportion would be greatly decreased when they came to issue further capital. To some extent, this had been brought about by the economical way in which they had raised their capital.

By the COMMITTEE: The maximum amount the Company would be able to raise in debenture stock would be £260,000.

Cross-examined: The price the Company obtained for the last ordinary stock sold by auction was £206, and that was in 1889. The market price was now £194 5s.; it had gone down just recently.

By the COMMITTEE: Witness believed it was the usual practice to put the premiums received on their shares to capital. There had not been any specific notice as to this sent to each debenture holder; but the usual notice was given in the papers. He was not aware that it was the custom when they were going to reduce the security of a large number of debenture holders, to send round a circular, asking them whether or not they approved of it. He admitted that they had advanced £130,000 on the security of the gas-works as they now existed; and that, without altering the security, the Directors proposed to issue £260,000—thereby reducing the security by one-half.

Wednesday, June 24.

Mr. POLLOCK, before calling his next witness, stated that he had carefully considered with his learned friend, Mr. Balfour Browne, the observations that fell from the Committee with regard to debenture stock. There had been decisions in the Law Courts on the Companies' Clauses Act, and the Companies' Act of 1863, and the amending Act of 1869; and their own clause was the model one put into all Bills. There might be some doubt; but as far as they could at present see, they believed that the £130,000 would have priority, because the clause said that all debenture stock issued after this Act was to rank *pari passu*, which would leave the other ranking as it was. If, however, this was not so, his clients said that the intention was that the prior right of the existing stock should not be interfered with; and if it was necessary to make it more clear in the Bill, they could do it when they came to the clauses. This seemed to him to be the proper course.

Mr. *M. C. Arnholtz* deposed that he had been in the employ of the Bristol Gas Company for two and a half years as Chemist. The coal which the Company now used would produce gas of about 15-candle power; and if a higher illuminating value were required, they would have to use more cannel, which would increase very considerably the cost of manufacture.

Mr. *W. W. Fiddes* stated that he had been in the service of the Company for upwards of 29 years. The coals at present used to produce the gas came from the Radstock district, Gloucestershire, and South Wales. They could not rely upon getting more than an average of 15 candles from these coals—that would be testing the gas at their own works. In order to obtain gas of the illuminating power now supplied in Bristol, they had been obliged to introduce cannel, which had to be brought from a great distance, and was therefore very expensive. Under the Company's present Act, they were bound to supply gas of 13¼-candle power at the Corporation testing-place, and 14 candles at their own works. The testing-station was situated at the lowest level of the city; and there had been instances of differences of 1½ to 2¼ candles between the readings taken at this place and the works. In his judgment, it was absolutely necessary that there should be a considerable outlay on new manufacturing plant.

Mr. *G. C. Trewby*, M. Inst. C. E., Chief Engineer of The Gaslight and Coke Company, said he had had upwards of 35 years' experience in the manufacture and distribution of gas; and for about six months he had acted as Consulting Engineer to the Bristol Gas Company. During last winter they were working up to the full extent of their manufacturing places; and he had advised the Directors that certain extensions ought to be put in hand at once. With regard to the proposed doubling of the capital, he thought it was a very good measure, looking at the fact that workmen agitated when they found a Company were declaring a dividend of 10 per cent. They thought this was a very high rate; and that their wages ought to be increased, and the hours of labour lessened. As to the testing of the gas, he had heard of the differences between the results obtained at the gas-works and the Corporation testing-place; and he suggested as an explanation that, photometry not being an exact science at present, the results given by photometers could not be absolutely relied upon—in fact, a large margin was necessary to work with safety. The standard of illuminating power in the Metropolis was 16 candles; but outside it was 15 candles, and in some cases lower than that. In the case of his own Company, they found in the winter time that the gas lost as much as a candle between the Beckton works and the City. With the coal the Bristol Company employed for manufacturing purposes, they had to use a large percentage of cannel, in order to get the required illuminating power; and the more cannel they used, the greater the cost of production. The quantity of cannel employed increased in a greater proportion than the candle power—that was to say, the cost per unit of candle power for common gas was a certain figure, and for cannel gas a very much higher figure when they came above 15 candles. He did not think an ordinary consumer would perceive the difference between a 15-candle and a 16-candle gas; whereas, on the other hand, a reduction of 2d. in the price was appreciated, but the reduction would be retarded by the increased use of cannel. Taking into consideration the circumstances connected with the Bristol works, he thought an illuminating power of 15 candles was ample. As to the supply of gas in bulk, he did not see how it could in any way be injurious to the present consumers. It would really be a benefit, because the more gas the Company had to make, the cheaper it could be produced. Respecting the question of new works, he said that he estimated that £100,000 would be required almost immediately, and then the expenditure would be gradual year by year—depending, of course, upon the increased consumption. In the first place a further retort-house was required, and also a gasholder to contain 5 million cubic feet of gas. The expenditure he had mentioned would be incurred within the next two years; and when the whole of the plant had been equipped, about £200,000 would have been expended.

In cross-examination, witness said that the £100,000 would be spent within the next two years; and the remainder as the business expanded. He had made a report to the Company in writing as to the additional works needed; but that did not contain any estimate as to the expenditure. The new retort-house would not enable the Company to get a better result from the coal carbonized; but they would then be in a position to work more economically as far as labour was concerned. Asked whether he thought they would be able to deceive the workmen in these days by doubling the capital as proposed, witness said that it would show them exactly what dividends the shareholders were receiving.

Mr. *Corbet Woodall*, M. Inst. C.E., deposed that the business of the Company was increasing very rapidly. In 1881, the consumption of gas was about 934 million cubic feet, while in 1890 it was no less than 1329 millions; and he understood that the rate of growth had been considerably greater during last year, and the early portion of the present one. It seemed to him that the Bill, as presented to the Committee, was intended simply and solely to secure and carry out economy. The Company had a very good record. In 1883, the capital employed per million cubic feet of gas sold was £760; while in 1890 the proportion was £585—showing that the increased business had been obtained at a small expenditure of capital. The importance of this to the consumers was seen in the fact that the dividend paid in the year 1883 cost 11·68d. per 1000 cubic feet of gas sold; while in 1890, it was only 8·88d. This was a difference of 2·8d., and meant more than £16,000 a year to the public. As to the suggested change in the nominal amount of capital, this would not injure the consumers in any way; but they might be benefited by the fact that the 5 per cent. capital would sell for a better price than the 10 per cent. Regarding the borrowing powers, he saw no objection to the limit asked for in the Bill—that was, one-third of the share capital, *plus* the premiums. Whether the money had been raised as premiums, bearing no interest, or raised as 10 or 5 per cent. capital, it was all invested in the works, and formed security for the amount that was borrowed. In the event of the Bill passing, the total nominal share capital and premium would be £1,230,000; but the actual amount, if the conversion of the capital did not take place, would be £788,000. In his opinion, under the circumstances of the Bill, £100,000 would not be an excessive sum for a reserve fund. As to the illuminating power, he did not like to go back from what he said in the other House, that he thought the consumer should have gas of 15-candle power; but some suitable testing-place should certainly be provided in the city.

Cross-examined: Witness said he could hardly discriminate as to which was the best security for a gas company—a low price or a reserve fund. He would not say one was as good as the other; but both were necessary. Regarding the illuminating power, he had no hesitation in saying that the consumer would rather have 15-candle gas at the price it was now being sold at, than pay 2½d. per 1000 cubic feet more to have 16-candle gas.

This concluded the evidence in support of the Bill; and witnesses were at once called on behalf of the opponents.

Mr. *G. Pearson*, a member of the Bristol Corporation and Vice-Chairman of the Sanitary Committee, said that the latter body were continually complaining of the quality of the gas and also the price; and, in his opinion, the general view of the public was that the gas was not of a sufficiently high illuminating power.

Mr. *Edmund H. Stevenson*, M. Inst. C.E., averred that the proposition contained in the Bill to duplicate the capital and the reserve fund was absolutely unique. He had never seen or heard of a Bill, and there certainly was not an Act, which authorized it; nor was he aware that a company had ever applied for such powers before. Modern legislation enabled gas companies to make any reserve fund they liked; but they must take it out of profits which they would otherwise pay in dividend—that was to say, they must surrender dividend. They were, however, permitted to create an insurance fund of 5 per cent. upon the capital for the purpose of meeting special claims; and this was in addition to the reserve fund. In the present case the promoters were asking for a 10 per cent. reserve fund, not only upon the capital which had gone into the concern, but upon £200,000 of extra capital which was not represented anywhere. He never heard of such a thing as allowing a reserve fund upon what was mere paper capital; and, having regard to all the circumstances, there was no reason why a larger reserve should be permitted in this particular instance. He did not believe that the Company would be able to issue debentures at a higher rate if they had the reserve fund asked for. It must be remembered that it had not yet accumulated; but the debenture holders would have it in prospect. The chief security a gas company could have was a low selling price for gas; and added to that, a large amount of premiums invested in the undertaking bearing no dividend, and yet earning a dividend for the other stock. He did not see that there would be any extra risk in the duplication of the capital; but it seemed to him an absurd proceeding. He contended that the minimum illuminating power in a large provincial town should be 16 candles; and he thought the existing testing-place was fairly in the centre of the city.

In cross-examination, witness said he did not think he could mention a company in Gloucestershire which was obliged to give an illuminating power of 16 candles; and he agreed that in the majority of towns the testing-place for the gas was at the works of the company. The position of the Bristol Company, and the fact that they had had the auction clauses since 1853, was almost unique. The Ashton Gas Company was the first to have the auction clauses—in fact, he believed that Company and the Bristol were the only two in those early days; so that Bristol had been very fortunate in getting a long start of the consumers in other towns.

Mr. *Harry E. Jones*, M. Inst. C.E., the Engineer to the Commercial Gas Company, also stated that he had never heard of a Gas Company obtaining power to duplicate its capital as was proposed in the present case. He did not think it was fair that there should be any indirect alteration of the terms under which the capital was given by Parliament. He saw no justification for disturbing the reserve fund or the amount of loan issued. Concerning the illuminating power, he thought that, for a city of the scale of importance of Bristol, the illuminating power might be something larger than was usual for companies outside London and the cannel districts; and he considered that no hardship would follow the standard being raised to 16 candles, provided always that a penalty did not accrue for the bare fraction of a candle deficiency. He thought that the testing-place ought to be close to the junction of the large mains coming direct from each of the three stations of the Company.

Cross-examined: Witness said that he advocated the principle that there should be an illuminating power of 16 candles, with the penalty not enforced unless it fell to 15½ candles. That was pretty much the same as the clause in his own Company's Act.

Mr. PEMBROKE STEPHENS then addressed the Committee on behalf of the Corporation. He asked the Committee whether they had not seen that, all along the line of the Bill, in one clause or another, a power of a distinctly exceptional kind was asked for; and also whether any ground had been shown, to their satisfaction, in the circumstances of the Company, for any unusual legislation. It was admitted that the Company was a prosperous one; that it was paying 10 per cent. dividend; and that the reserve fund, although not full, was well on that way. Therefore, if things were left alone, it was a Company from which the consumers were on the eve of obtaining substantial benefits. The Company had had differences with their workpeople; and they thought that the division of the 10 per cent. capital into two would throw dust in the eyes of the latter, or at all events put their Directors in what they considered was a more satisfactory position. The Company were paying 10 per cent., and had done so for years past; so that, whatever change they made to mystify the workmen, a 10 per cent. Company it would be still. Referring to the proposed extension of works, the learned Counsel pointed out that, from the beginning to the end of the preamble, there was not a word about works. The Company were intending to spend £100,000 on fresh works; and at the present time, they had unexhausted capital powers to the extent of £67,000. This, sold in the market, would fetch £134,000. One-third of the £67,000 gave them £23,000 to borrow; so that they had practically at their call £157,000. They also wished to double their reserve fund; but there was no precedent for doing this.

Mr. POLLOCK having replied,

The room was cleared. On the parties being again admitted,

The CHAIRMAN said that the Committee were of opinion that the preamble of the Bill was proved; but there were several alterations they desired to see made in the clauses. With regard to the borrowing powers, they wished "one-third" changed to "one-fourth;" so that it would read "one-fourth part of the amount of capital for the time being actually paid up in the undertaking." Then they desired some words inserted in clause 8, to make it quite clear that the fresh debentures should rank after the existing debentures. With regard to the sale of gas in bulk to local authorities or companies, the clause referring thereto would terminate at the words, "their own authorized limits of supply." The Committee also proposed to strike out the part as to the consent of the local authority for laying down mains.

The clauses of the Bill were amended in conformity with this decision; and the Chairman was directed to report it to the House.

HOUSE OF COMMONS COMMITTEE.

Tuesday, July 7.

(*Before Mr.* W. G. MOUNT, *Chairman; Mr.* CUST, *Mr.* HUGH ELLIOTT, *and Captain* M'CALMONT.)

SALFORD CORPORATION ORDER.

To-day the Provisional Order for which the Salford Corporation have applied to the Local Government Board, to empower them to borrow an additional sum of £134,000 for their gas undertaking, £18,000 on account of the water-works, and £50,000 for drainage and sewerage purposes, came before the above-named Committee, in conjunction with other Orders embodied in a Confirmation Bill. Inquiry was rendered necessary in this case in consequence of the Local Boards of Swinton and Pendlebury, and Barton, Eccles, Winton, and Monton, having opposed the portion of the Order relating to the gas-works. These authorities complained that for several years there had been gross mismanagement and lavish expenditure in the carrying on of the undertaking; that the Corporation charged a higher price for gas in the out-districts than they charged in the borough; and that the profits were applied exclusively to the benefit of Salford. They submitted that the supply of gas to their districts ought to be in their own hands.

Mr. BALFOUR BROWNE, Q.C., and Mr. HANS HAMILTON appeared for the Corporation; Mr. BIDDER, Q.C., and Dr. PANKHURST represented the opposing Local Boards.

Mr. BALFOUR BROWNE, in opening the case, said the Corporation of Salford had for a considerable number of years been the owners of the gas-works of the borough, and supplied not only their own district, but a considerable area outside, including Swinton and Pendlebury, Barton, Eccles, Winton, and Monton. It having now become necessary to make further provision for the supply of gas, the Corporation were seeking powers to acquire more lands close to the site of their present Regent Road station, and to erect additional works upon it. As the Committee would see, this would be extremely convenient, because the Corporation now had access to their works from the London and North-Western Railway system; and no great gas manufactory could be carried on without communication by rail with the collieries, for the purpose of conveying coal to, and getting the residual products away from the works. On the 24th of March last the Local Government Board held an inquiry in Salford into the application made to them by the Corporation for powers to raise further money. There was considerable opposition on the part of the districts of Swinton and Barton, who, inasmuch as they were increasing in population, just as the borough of Salford was growing, desired at some near date to supply themselves with gas. In order to do this, they would have to purchase the mains belonging to the Corporation, and would have to make full compensation to them for the injury they would sustain by losing not only their distribution plant, but two excellent customers who now took a large quantity of gas. If the Local Board applied hereafter for powers to supply themselves with gas, and acquire the works within their districts, he (Mr. Balfour Browne) was anxious that they should at the same time, by a Bill or a Provisional Order, take upon themselves the duty of supplying gas, and allow the Corporation full compensation for their property and interests in the districts. As a matter of principle, the Corporation were not prepared to object in any way; and he would further say that if the two Local Boards came within a reasonable time (say one or two years, while the circumstances remained as they were) for a Bill for the purpose, the Corporation would not oppose it so far as the principle was concerned. They would, however, of course, ask for full compensation. They would watch the Bill, and apply for modifications in certain details—for instance, in relation to way-leaves through the district, in order to supply places beyond, and matters of that sort. But they were prepared to say that they would not oppose the Bill upon the preamble. He thought the object of the Local Board in now appearing before the Committee was rather to secure their position in the future than to attack that of the Corporation in the present; and if this was all they desired, he was quite willing that the statement he had just made should go forth. His learned friends were, he believed, rather anxious that the matter should be put in the form of a clause to be inserted in the Order now before them.

Mr. BIDDER: That is the usual course.

Mr. BALFOUR BROWNE (after consultation with those who were instructing him) said he did not think he should advise his clients to resist the insertion of such a clause as that which was asked for; but, before doing so, he must call a witness, for the purpose of proving the preamble.

Mr. *S. Y. Shoubridge*, the Gas Engineer of the Corporation, then gave formal evidence in proof of the preamble, and stated that the total estimate for the acquisition of the additional land was £120,000, comprising all the necessary works and machinery, retorts, and so on, with £9000 for contingencies.

After some consultation between the parties as to the form of the proposed clause,

Mr. BIDDER announced that it had been agreed, subject to the approval of the Committee, to insert the following clause in the Order:—

If at any time within two years from the passing of this Act the Local Board for the district of Swinton and Pendlebury and the Local Board for the district of Barton, Eccles, Winton, and Monton, in the county of Lancaster, hereafter in this section called the Local Boards, jointly, or either of such Boards separately, shall apply to Parliament for power to supply the said districts, and the other districts within the limits of the gas supply of the Corporation, except the borough of Salford and the township of Prestwich, with gas, and to purchase such portion of the gas undertaking of the Corporation as is situate within such districts, then it shall not be lawful for the Corporation to oppose such application, except in so far as may be necessary in order to secure the insertion in any Act of clauses to protect their interests with respect to such purchase; and if such powers of purchase be granted, the Corporation shall sell, and the Local Boards shall purchase, such portion of the gas undertaking of the Corporation within the said districts, at such price as shall, in default of agreement, be fixed by arbitration under the provisions of the Lands Clauses Acts. In ascertaining or assessing such price, the arbitrators or the umpire shall be entitled to take into consideration whether the Corporation

are entitled to charge a differential rate to the out-districts; and, if requested by either party, shall state a case for the opinion of the High Court of Justice to determine the question. On the completion of such purchase, all powers, rights, and obligations of the Corporation, under any Act of Parliament, to supply gas within such districts shall absolutely cease and determine.

Mr. BALFOUR BROWNE: That is the clause we agreed to.

Mr. BIDDER: Upon that clause being inserted in the Order, our opposition is withdrawn.

Mr. BALFOUR BROWNE: That is practically an open arbitration.

The CHAIRMAN having declared the preamble of the Bill proved, the clauses were severally read and agreed to, amendments being made therein.

There being no opposition to the other portions of the Order, the Bill, as amended, was subsequently reported to the House.

THE METROPOLITAN WATER SUPPLY INQUIRY.

Nineteenth Day—Thursday, June 18.

(*Before Sir* MATTHEW WHITE RIDLEY, *Chairman; Mr.* T. H. BOLTON *Sir* A. BORTHWICK, *Sir* H. ROSCOE, *Mr.* BRISTOWE, *Mr.* LAWSON, *Mr.* J. W. LOWTHER, *Mr.* MURDOCH, *and Mr.* ROWNTREE.)

METROPOLIS WATER SUPPLY BILL

To-day further engineering evidence was given.

Mr. *G. F. Deacon*, examined by Mr. PEMBER, said that he had for eight years held the post of Engineer to the Liverpool Corporation, and had for 19 years been their Water Engineer. He was Engineer for the Vyrnwy scheme for the supply of the city. Liverpool was a very good instance of a Central Municipal Authority supplying water, not only to its own area, but to outside districts; the total population served on compulsory terms being about 800,000, of whom 600,000 were within the city area, which was 5210 acres, while the outer area was 64,345 acres, or more than twelve times the extent. In addition to this the Corporation had power to supply water in bulk or otherwise, by agreement, to other places within 20 miles on either side of the Vyrnwy aqueduct, and within 40 miles on either side of the Rivington aqueduct. This made the area of supply outside the city 445 times as large as that within it. In his experience of the working of the supply by the Central Authority of Liverpool, both to the outside and to the municipal district, he had generally found that it had been done without friction, and with satisfaction alike to all parties. The only exception was in the case of Bootle; but this difficulty had now been removed. Bootle sought representation upon the Water Committee of the Corporation; and this had been conceded to them. Bootle was a trading place; and the inhabitants had some causes of complaint—possibly on the ground that the water was not supplied through quite such large mains as it ought to have been, and the other privileges which were enjoyed within the city were not accorded to them. They did not pay so much as consumers in the city; but when additional facilities and representation were given to them, they were placed on exactly the same basis as the city. The representatives of Bootle voted on the Water Committee, but, of course, could not do so in the Council, as they were not members of it. It was the only outside district in which the Liverpool Corporation had power to levy a rate. He did not think there would be any practical engineering difficulty in applying to London the principle of a Central Municipal Authority for water supply purposes, which had worked so well in Liverpool.

Cross-examined by Mr. CRIPPS, witness said he thought the full burden of the Vyrnwy scheme had come upon the Liverpool rates. Until two years ago, the interest on the capital expenditure for the undertaking was entirely paid for out of the rates. The increased population was supplied with water by means of savings effected within the older districts; and the revenue from this source was sufficient to meet the payment of interest on the capital expenditure up to £1,800,000. The year 1829 was the first occasion of the rent being increased 1¼d. in the pound; and this had sufficed to pay the interest on the remainder up to the present time. The proposal of the Liverpool Corporation to extend their boundaries was resisted by the outside authorities, and was rejected by Parliament. One of the reasons put forward for the incorporation was the heavy obligation which the Corporation had undertaken in regard to the new water scheme. Before becoming the Water Authority, the Corporation obtained parliamentary power to purchase the works of the two Companies who were then supplying the town.

Mr. CRIPPS: From your experience, is not that the fair principle on which to start as a first step?

Witness: I certainly consider it was, in that case; but I do not think you can draw conclusions with respect to that particular matter in reference to London, because they were two very small Companies, only supplying water for a few hours on three days in each week.

Do you think a competing scheme should, in any case, be allowed before purchase by a Municipal Authority?—Not in the present condition of affairs; but if great difficulties arise in connection with the purchase of the Company's works, then it would be practicable. I do think that the Companies should be properly paid, but that the Arbitrators should be limited on certain points.

Assuming that any prudent buyer would look into the matter before he actually completed the purchase, and assuming that this has been done in the case of all other corporate bodies, why should there be any such special investigation with reference to London?—Because, having regard to the fact of there being eight Companies, some of which, if amalgamated, might be worked under more economical conditions, and having regard to the fact that, in one case at any rate, only a small proportion of the entire supply of the Company is within the boundary of the County Council, I think very mature consideration is necessary, more so than in the cases of Birmingham, Liverpool, and Manchester.

If the arbitration is on fair terms—that is to say, as to the price—between the corporate body and the Companies, what need is there for investigation, except before an Arbitrator or the Board of Arbitration?—The County Council, in order to prepare their case to place before the Arbitrator, would require at least twelve months.

I quite agree with you. Give them twelve months, or three years; but why should they not consider their case, like other corporate bodies, and then bring forward their scheme?—I do not know why they should not, if the power is given to them to do so; but they have not power to spend money or to bring in a Bill.

Do you suggest, as a difficulty in the case of London, that the Water Companies have too much water?—Certainly not. The supply will be all wanted if it is good.

Does it not all come back to this—that before you can discuss a question of this kind, the corporate authority or the County Council must have thoroughly considered the matter before bringing forward any scheme?—Certainly.

Mr. CRIPPS read to the witness a passage from a speech made by him at the Society of Arts in 1882 on the London Water Question, in which he stated that the average supply was 35 or 36 gallons per head, but that there could be no difficulty in reducing it to 20 gallons.

Witness said that, on further consideration, he might put the 20 gallons a little higher; but great credit was due to the London Water Companies for the reduction they had effected by the prevention of waste concurrently with the introduction of the constant supply. In Liverpool they began with 29 gallons, and had reduced it to 22 gallons, which included 7 gallons per head per day supplied by meter for trade purposes.

Sir H. ROSCOE: Is the system of measuring general in Liverpool?

Witness: Only for trade purposes. It is not so general as in other towns. A great deal of the trade water is not supplied by meter; but 7 gallons would probably be increased to 8¼ gallons.

Mr. LAWSON: In the case of small manufactories, do you offer them a supply by meter, and they refuse it, or do you refuse it when they wish for it?

Witness: They are glad enough to come. I would not call them "manufactories," because most of the actual manufactories are supplied by meter; but in the smaller trades, the supply of water is assessed if it is not a purely domestic supply. The assessment is under a sort of agreement.

Mr. RUSSELL GRIFFITHS called attention to the fact that it appeared, from the report of the Official Water Examiner for 1889-90, that the general average supply in London was 29·61 gallons per head per day, of which 23·93 was for domestic purposes.

Cross-examined by Mr. LEWIS COWARD: He could not say if in Liverpool the water-rate on a £7 house would amount to 9s. a year; but he had no doubt it was higher than in the provinces—such as Manchester, Salford, Birkenhead, and Brighton. But then the rate in Liverpool included the interest on two millions of money expended on the Vyrnwy scheme, which was entirely unremunerative at present. Taking the rates of the New River, Grand Junction, and Chelsea Companies at 5s. 7d., that of the West Middlesex at 5s. 2d., that of the Kent Company at 8s., and those of the East London and the Southwark and Vauxhall at 7s., he did not think they compared very favourably with Liverpool.

Cross-examined by Mr. RICHARDS: Witness thought the water supply of London was physically complex only by reason of the number of Companies supplying from different levels and under various conditions, and abutting upon one another. Absolute severance along the line of the county boundary, he thought would be undesirable, costly, and inconvenient, because they would not be able to arrange pressures and supplies so satisfactorily as if they had command of both sides. He knew that the supplies of the East London Water Company were drawn from wells and from the Thames; the wells being within the county of Essex.

Mr. RICHARDS: Do you see any difficulty—I am not talking about equitable difficulty—in the supply within the county of Essex being preserved for that county, and for the local authorities to deal with it, leaving the intake from the Thames to the county of London?

Witness: I am not in a position to answer that question, because I have not had an opportunity of investigating those particular matters, which I think ought to be open to full inquiry before the purchase. If the outside districts were represented to any extent, it would not conduce to the economical management of the business of the undertaking. They should be in a position to be represented before the Arbitrators; and I should be sorry to say that there was no case which could not be conveniently and properly represented. If each place sent a representative, it would make the Committee an unwieldy one. They should have a right to be represented by Counsel on the question of purchase; but the mode of supply and everything of that kind should be left to the Central Authority.

Cross-examined by Mr. RICKARDS: He agreed with Sir T. Farrer and Mr. Binnie that the water undertakings of the Metropolis would have to be purchased sooner or later; and he thought they ought to have been acquired before this. In the case of Liverpool, an obligation was imposed upon the Corporation to purchase, and upon the Companies to sell the then existing works; and the terms of purchase were settled either by agreement or by arbitration.

By Mr. ROWNTREE: In the case of Bootle, the rates were equally liable with the rates of Liverpool to make good any deficiency on the water undertaking.

By Mr. LOWTHER: The questions of general policy with regard to the supply of water was decided by the Liverpool City Council, which might override the Committee on which Bootle was represented. The substantial reason for the rates being the same in Liverpool and Bootle was the representation of the latter town on the Committee.

By Sir H. ROSCOE: The investigation which led to the Vyrnwy supply being carried out was made by the Water Committee who reported to the Council. His first report on the subject was dated 1877; but from the time he was appointed, in 1871, the question of a new supply was under discussion, and previously by his predecessor, Mr. Duncan. The quality as well as the quantity of the Liverpool supply had to be taken into consideration. One-third of the water was obtained from wells in the new red sandstone formation. But one by one these wells had to be abandoned, especially those nearest to the river; and the quality of the water from the existing wells had not been always satisfactory.

By Mr. LAWSON: The water-rents in Liverpool had been increased; but he thought they would soon fall again. He considered that the present rate of increase would recoup the difference, and they would be able to pay for the new supply entirely out of the old rates. If Liverpool had double its present population, the rate would be lower than it had ever been before. The Vyrnwy supply, including all charges, cost something less than £2,100,000. The work was commenced in good earnest in 1881; and the bulk of it was completed more than a year ago. Unfortunately, they had had a difficulty under the Mersey; but this had now been overcome.

Mr. *H. L. Cripps*, the Parliamentary Agent of the London County Council, was recalled, and produced further correspondence from the Local Authorities within the Council's area, showing that the Vestries of St. George's, Hanover Square, Rotherhithe, and St. Mary, Battersea, were in accord with the action of the Council.

Mr. FREEMAN said that, in the course of the inquiry, allusion had been made to a speech delivered by Sir J. Lubbock, in which he had expressed his opinion that such undertakings as water-works were, as a rule, more economically managed by private enterprise than by public bodies. He should desire, if the Committee wished, to call Sir John on this subject.

The CHAIRMAN said he did not think the Committee wanted to hear anything on that point.

Mr. FREEMAN said that this would be all the evidence he should offer on behalf of the County Council. He proposed that the cases of the outside Local Authorities and of the Thames Conservancy should be proceeded with; and then Mr. Moulton would address the Committee on the Council's case.

Mr. PEMBER, Mr. POPE, and other Counsel, demurred to this proceeding; and urged the Committee to call upon the County Council to conclude their case in the usual way before any other opposition was proceeded with.

After some discussion,

The CHAIRMAN said the view of the Committee was that the Council must close their case in the usual way; and they would adjourn for a short time to enable Mr. Freeman to confer with Mr. Moulton.

On the proceedings being resumed, Mr. MOULTON made an appeal to be allowed to defer his speech till the following Tuesday, as he did not expect to be called upon to address the Committee so early.

This course was agreed to.

Mr. H. C. RICHARDS then addressed the Committee on behalf of the East Ham Local Board. He said the action this body were taking had the approval of the Essex County Council and of some other Local Authorities, who, although not appearing, were supporting them in their opposition. Between 1881 and 1891, the population of East Ham had increased from 9000 to 32,000; and on their behalf he suggested that if the City of London were entitled to representation on the Central Authority, so also were the outside areas. But before this point arose, some protection should, he maintained, be given to the Local Authorities outside the County Council's area, so that they might have a voice in, and some knowledge of, the negotiations that were taking place for the acquisition of the powers of the Water Companies. They felt that, whatever happened, upon any acquisition of the water supply from the Companies, each Local Authority should be the distributing power within its own district. The first point he would urge was absolute and complete severance from the County Council, which he believed was both physically and equitably possible. As far as East Ham was concerned, they objected to have anything to do with, or to be under the authority of, the County Council. But, if the Committee saw fit to constitute the proposed Statutory Committee of the Corporation and the Council as the Water Authority with power to purchase, then he asked that the position of the outside areas should be considered, and that they should be made parties to the arrangement, or at all events have a right of audience when they came to consider the questions of the price to be paid for the works, and the scheme by which the Council might in future think fit first of all to charge for, and secondly to distribute, the water. With regard to the East London Water-Works, he suggested that the Council should only have the right to acquire so much of the property of the Company as was used for the supply of water to the area within the City of London, and that power should be given to the Local Authorities outside to purchase the supply within the area of their respective jurisdictions.

Mr. LAWSON asked if, in the alternative of representation being given to East Ham, Mr. Richards proposed to pledge the rates of the district in the event of any deficiency.

Mr. RICHARDS replied that he was instructed that they were prepared to do that.

Mr. MEYSEY THOMPSON then addressed the Committee in support of the case of the Richmond Corporation against the Bill. He said Richmond was in a very peculiar position; being technically within the area of the West Middlesex Water Company, who took through their district two or three large mains charged with unfiltered water, unsuitable for domestic use. The Company had been unable to give them water; and the Local Government Board had therefore authorized the Corporation to provide their own supply, upon which they had spent the sum of £70,000. In addition to this, the Southwark and Vauxhall Water Company were put under the obligation to supply in bulk to Richmond 1,000,000 gallons a day, if required. Sometimes they did not take any water from the Company (at others, in summer, a small quantity was taken), because their own supply cost them 3d. per 1000 gallons, whereas they had to pay 1s. per 1000 gallons for the Southwark and Vauxhall water. Quite recently, a new source of supply had been struck, which they hoped to make use of in the near future; and this would still further diminish the quantity taken from the Southwark and Vauxhall Company. The consequence of the passing of the Bill before the Committee would be that they would become part of the Metropolitan water area; and that then the County Council, or whoever had the control of the supply, would have the right to bring water into the Richmond district, and compete with the Corporation.

Mr. PEMBER (for the promoters) said they would be perfectly happy to let Richmond remain, under the new Water Authority, just as it was at present.

Mr. MEYSEY THOMPSON said that unfortunately the promoters were not the only persons concerned. He asked that the Committee should guard the interests of Richmond in this respect. They did not mind remaining technically within the water area; but they objected, while providing their own independent supply, to be rated for the purpose of making up any deficiency in the water supply of the Metropolis, or to have a competing supply brought into the borough.

Mr. *F. B. Senior*, Town Clerk of Richmond, examined by Mr. MEYSEY THOMPSON, produced the correspondence with the West Middlesex Company, in which the Company said they could not undertake to supply Richmond. Thereupon the Local Government Board authorized them to provide an independent supply. This was done by raising a loan of £70,000, with which they established water-works, consisting of two artesian wells, two pumping-stations, a large reservoir, and about 30 miles of mains. These wells, with the water they obtained from the Southwark and Vauxhall Company, afforded a good supply. In 1874 this Company applied for power to supply Richmond; but Parliament refused to grant it, though a clause was inserted in the Act, placing the Company under the obligation of supplying the town with water in bulk not exceeding 1,000,000 gallons a day, at the price of 1s. per 1000 gallons.

Cross-examined by Mr. RICKARDS: They were under the provisions of the Water-Works Clauses Act as to furnishing a supply on the request of a number of residents in the district; and possibly they might have compelled the West Middlesex Company to give them a supply. They did not, however, proceed under this Act, but applied to the Local Government Board under the provisions of the Public Health Act.

Twentieth Day—Tuesday, June 23.

On the resumption of the proceedings this morning, some further evidence was called before Mr. Moulton addressed the Committee on behalf of the London County Council.

Earl *Cowper*, K.G., Chairman of the Hertfordshire County Council, examined by Mr. BALFOUR BROWNE, Q.C., said the subject of the water supply had been considered by the Council; and they were of opinion that the proposals of the Bill, if carried out, would so greatly diminish the quantity of water in Hertfordshire, that it might run some of the rivers dry in their upper courses, and that it would considerably lower the wells throughout the county. The New River and East London Water Companies had power to take practically the whole of the water of the principal river flowing through Hertfordshire, except what was sufficient for navigation; and by their statutory powers and their rights at Common Law, they were enabled to abstract large quantities of water from the chalk by means of wells. This was doing serious harm to the water supplies of the district. Before anything was done to further prejudice the position of the county, an inquiry of some sort ought to take place before a competent authority. He objected to the inquiry being held by the London County Council, as it would be an interested body, and would think only of the wants of London, to the neglect of the interests of Hertfordshire. The question was really partly between the supply necessary for London and that which was required for Hertfordshire.

Cross-examined by Mr. RICKARDS: He did not suggest that the Water Authority should be precluded from availing themselves of water from the New River for the supply of London in the future. But they were suffering already from some of the wells that had been sunk by the New River Company; and, of course, they would like to have this injustice removed. What they were chiefly anxious about was to prevent any increase of it. He was quite aware that the New River was an artificial river specially created for the purpose of the water supply of London.

Mr. LAWSON: Do you see any damage that is likely to accrue if the powers given to the new Water Authority are only those now exercised by the Water Companies?

Witness said he did; as there was harm being done now. During the last ten years there had been a decided diminution of water, which was traced by many people to the action of the Companies in pumping water from the chalk. The new Water Authority would under this Bill obtain extra powers of buying land and sinking wells.

By Mr. BOLTON: He was anxious also that the East London Company should not have more powers than at present for taking water; but he did not think their power was unlimited except from the river itself. What affected the people in Hertfordshire who lived above the point from which they took the water was the sinking of the wells. Therefore if further land was bought and additional wells were sunk, more harm would be done than now to the people who lived on the upper parts of the river.

Mr. BAGGALLAY said, if there was any question arising as to the power of taking water from the Lea, he did not know whether or not the Committee would shut out the evidence of the New River Company and the East London Water Company on this point. Of course, it was part of their case that the quantity and quality of the water were sufficient; and they would ask to give evidence upon it.

The CHAIRMAN said the Committee had already intimated that they could not be in a position to express an opinion as to the quality or quantity of the water of any of the Companies.

Mr. BAGGALLAY said, after the questions which had been put, it seemed to become necessary, in the interests of those Companies, to show what was their position in regard to taking water.

The CHAIRMAN: The evidence which Earl Cowper has given appears to me (subject to what we may discuss) to come to this—that as their interests are deeply involved, even at present, in connection with the wells, there ought to be a full inquiry by an independent body before any new rights are acquired by anyone else in the place of the existing Water Companies; and I do not see how the Companies are prejudiced by that expression of opinion. Of course, the Companies will have an opportunity of stating their case before this Committee; and if anything has been said by a witness which they consider requires denial very shortly, I do not think the Committee ought to preclude them from dealing with it. At the same time, I think I may say, on behalf of the Committee, that they themselves would be very careful not to express any opinion that there has been any disparaging evidence given either as to the quality or the quantity of the water supplied from the rivers.

Mr. *R. D. W. Littler*, Q.C. examined by Mr. WORSLEY TAYLOR

said he was Chairman of the Middlesex County Council, and also of the Wood Green Local Board, which was supplied by the New River Company. The Council included some 20 or 30 Local Authorities, who were looking to them to protect their interests in the question before the Committee. All the intakes on the North side of the Thames were in the County of Middlesex. The West Middlesex, Grand Junction, and New River Companies all had powers which in some cases were not used. But the greater portion of them were exercised within the county; and a very large proportion of the thickly inhabited part of it was supplied, in one way or the other, by the various London Water Companies. On the west there were pumping-stations, wells, and reservoirs at Bourne Hill and Highfield, and also at Betstile. From the Bourne Hill and Betstile wells, he believed a very large portion of the water was supplied to the two northern districts of the New River Company. There were also within the county independent water supplies, such as that of the Barnet Company, the Rickmansworth and Uxbridge Companies, and the Tottenham Local Board. The district was increasing very rapidly; and in some parts of the County, it would be a serious matter for consideration how the water was to be provided, especially if attacks such as that which Mr. Webster was making upon the sources of the district were continued. Mr. Webster had such wells upon his own property, and availed himself of the law, under the case of *Chasemore v. Richards*, to do that which certainly was not contemplated when that decision was given by the House of Lords—that was to say, having such wells, he had made arrangements with his neighbours for way-leaves, without any parliamentary or other authority whatever, and was proposing to sell to the London Water Companies 10 million gallons of water which did not belong to him. As there was no property in water, nobody could stop him; for, although it was not his, it belonged to nobody else. The question as between London and Middlesex could be settled in one of three ways—by severance, by supply in bulk, or by supply in detail. It was very difficult to decide, without more information, which of the three should be adopted; but his own feeling and that of the majority of the population he represented was that they should be absolutely independent, and have their own water supply from source to delivery. In order to decide the questions at issue between London and Middlesex, it would be necessary to have an inquiry, which would in all probability lead to an agreement on the greater number of the points in difference. He thought the County Council for Middlesex should be placed in a position to promote Bills in Parliament on the water question. There ought to be no power to buy up the undertakings of the Water Companies until the principle upon which they were to be bought was settled. According to the Bill before the Committee, the Water Authority might go and buy Mr. Webster's pumps, and drain the whole of that part of the county.

Mr. BIDDER (in cross-examination): If I understand your view, the matter in respect of which you desire further light and information is as to the ultimate arrangement between yourselves and the London County Council or the London Water Trust for partition of the undertakings and sources of supply on the north side of the Thames?

Witness: That is so.

You have entertained no doubt as to the expendiency of the water supply going into the hands of a public authority?—Those who have had as much experience as you and I have about it, know that in some cases it is an open question even. I am by no means sure that London is not very well off as it is. But it seems to be a foregone conclusion that the water undertakings are to be bought up; and, if so, what I desire is that I shall be present at the purchase. I seems to me it is not well, if we are eventually to have (say) the Grand Junction Company's district, that the other part of the district should be taken into London—that at first London should buy, and then that we should buy from London. It is very much better that we should go and have it settled at once.

In cross-examination by Mr. MOULTON, witness said he thought that both County Councils should have free hands, and that, in any inquiry for the purpose of obtaining information, Middlesex should be represented.

Cross-examined by Mr. RICKARDS: The question whether the County Council for Middlesex or the Local Boards in the county should have the control of the water outside London was a matter of detail which, witness thought, could be settled between themselves after the whole thing was disposed of otherwise. Personally, he favoured the idea of leaving the Companies alone; and he did not care who had the management of the supply inside London. All he was concerned about was that, if there was an alteration, the Middlesex County Council should have the supply in Middlesex. He did not think the preliminary inquiry would take very long; and it would be much better to wait until next year or the year after than to jump now. He would preserve an appeal to Parliament, however strong a body—whether a Royal Commission or otherwise—conducted the preliminary inquiry. The question of future sources of supply should be dealt with by Parliament alone. The supply of water to 5,000,000 people was one of the most important pieces of legislation Parliament could undertake. The principle of compensation to the Companies, if their undertakings were purchased, would have to follow the general law. It would be most unjust if it did not.

Re-examined by Mr. WORSLEY TAYLOR: There were many points—such as the engineering capacity of the intakes, the pressure, the arrangement of the pipes, the mains, and other things—about which they had at present no knowledge, but which were absolutely or largely within the knowledge of the Water Companies; and he did not see any way in which they could be made to give the information except before a Parliamentary Committee or a Royal Commission. There must be full knowledge on both sides to enable negotiations to be carried out.

By Mr. LAWSON: He did not think Arbitrators ought to decide the matter without reference to Parliament. Parliament should ultimately settle the principle for itself, both in justice to the Water Companies and to the people.

Mr. LAWSON: Do you not think that Parliament might be unwilling, after the experience of 1880, to take upon itself the decision of the bargain to be made as between the Companies and the public bodies?

Witness: I think that is much more a question for Parliament; but I am of opinion that a great many people repent that they did not leave Parliament alone, and let it do what it thought fit in 1880 or 1881. It would have been much cheaper for the consumers if they had done so. As far as I can judge of the feeling of the people, they would be glad if Parliament would settle the question one way or the other.

By Sir H. ROSCOE: With regard to any claim on the part of the Thames Conservancy to be represented on any body conducting the preliminary inquiry, they had simply sold the water of the Thames; and he did not see that they had much to do with it. They could not have a great deal to say on the water supply, especially after the emphatic decision of the Committee that they were not disposed to recommend any further abstraction of water from the river. So long as the quantity was not increased, it did not seem to him to matter to the Thames Conservancy.

By Mr. BRISTOWE: If the Middlesex and London County Councils could agree as to the purchase of the Companies' works as a whole, it would save great complication. He was very much in favour of purchase by agreement, as a principle. If the London County Council had power simply to agree to purchase, and then it was left to that body only to decide on what terms Middlesex should have its share, he was sure they would not regard the position as being anything like satisfactory. They could not enter into negotiations unless each had an absolutely free hand.

Mr. MOULTON then proceeded to address the Committee on behalf of the London County Council. He said he appeared nominally as the opponent of everything; and yet, of all people, his clients were most vitally interested in the question—not only in the subject-matter of it, but interested in so far as this, that by no act of theirs should there even be any delay in its final and satisfactory settlement. It was admittedly a very difficult subject; and attempts to deal with it began so far back as 1821. But the necessity of a speedy solution of the problem was beyond all contest. The question of the London Water Supply was becoming more and more pressing, from physical reasons. Apparently the quantity which it was wise to allow one of the great sources—the Lea—to give to London had been transcended; for whereas a Commission decided 15 years ago that the Lea ought not to be called upon to supply more than 50 million gallons a day, the amount had already crept up to 73 million gallons—no less than 60 millions coming direct from the river. The Thames, too, was drained to such an extent that something like 30 per cent. of its total flow was taken away before getting to Teddington Weir; creeping up in the hot days of summer to 40 per cent. No one could think of the influence on the large river—and that a drainage river—of drawing from it such a large quantity of water, without feeling that London had come to such a pass that it must look round and carefully consider its position, or it would get into pressing difficulties if it neglected it. The reason the matter had been so greatly neglected in the past was that there had been no one representative body in London which had the power to deal with it. But now that the County Council had been constituted, this was the body that should solve the question, and solve it in its own way, subject to the approval of Parliament. He did not think that past investigations into the question had been wasted; for although no direct action had been taken, experience and consideration had gone on accumulating, and the time had now arrived when effect could be given to the recommendation of Sir W. Harcourt's Committee, that the water supply of the Metropolis should be placed under the control of some public body "representing the interests and commanding the confidence of the water consumers." This body now existed; and the work could be carried out as proposed by the Statutory Committee of the Council and the Corporation. The proposition of the Vestries' Bill, or what remained of it, was that there should be immediate compulsory purchase of the whole of the water undertakings. The policy of the Council with regard to London was centralization in the hands of themselves and the Statutory Committee. The policy as to the outside area was, as far as possible, to consider their local peculiarities and situation, and to do all they could to throw into the hands of the bodies there elected by the people the actual distribution of their water; and it might be to assign to them in some places specific sources of supply. The Council desired to have considerable freedom of action in regard to details of administration; but it would place its policy on record, and would be prepared in due time with a scheme for solving the difficulty. In connection with the proposed inquiry by a Royal Commission, he wished it to be distinctly understood that the County Council welcomed it as a method by which, quickly and authoritatively, certain definite questions of fact might be elicited, and information obtained upon them by a body which would not be suspected of leaning on one side or the other. In fact, it would be to take care that all the people who were interested in the bargain to be made should have the maximum of information, in order that there might be the greatest probability that the conclusion arrived at would be one which would not be futile in its working because it had been based on errors. They certainly hoped that the Committee would see their way to recommend that such a Commission might primarily work at the facts of some of these questions: The adequacy of the existing supply; the length of time it was likely to be sufficient; the question whether its quality was so good that it ought to be relied upon; and what were the sources of supply upon which, failing the present, London must fall back. This was a national question, in which they should receive the assistance of a Royal Commission. Evidence had been given that Birmingham was now bringing forward a scheme whereby it was going to appropriate one of the Welsh collecting areas, and convey its water all across England. If the pressure of population, due to the enormous development of towns characteristic of to-day, was going to make local authorities go so many miles, or hundreds of miles, away in order to seek good collecting areas, then the right to these areas was no longer a local question, but must be looked upon as affecting the whole of the kingdom. Therefore some high authority, like that of a Royal Commission ought to consider how such areas should be apportioned, and what sources of water might be properly looked to by London for the supply of its future need. The Commission should have the questions upon which it was to report carefully limited; and all the information it obtained would be used by the bodies which were framing their plans. It would not affect the duty of the County Council, to bring before Parliament at the earliest moment a scheme

which they would be prepared to support with sufficient evidence for settling the question, and he could not help thinking that such an inquiry, instead of prolonging the solution, would shorten it. Having criticized the Vestries' Bill, and referred to the amount of local support given to it, as compared with that which was accorded to the policy of the County Council, he said that to be compelled to purchase the water undertakings before inquiry would tie their hands, and render it almost hopeless to attempt to make any agreements with the Companies. Some questions had been put to witnesses as to whether the Council were going to propose an additional supply, whether this would be right, and whether it would be in accordance with precedent. It was the intention of the Couucil to ask leave to bring in a Bill for an alternative supply before purchasing the undertakings. He did not say they intended to carry it out; but they ought not to be fettered in any way with regard to it. This question was raised before Sir. W. Harcourt's Committee; and the Committee were clearly of opinion that it was within the competence of Parliament to consider whether any rights of monopoly had been granted, and, if necessary, to deal with them in a way which would do justice. The idea of an alternative supply was not one that was in any way excluded from the consideration of Parliament. He did not say that the County Council would make out, or even seek to do so, a case for introducing a competitive supply; but if it should appear that they had assumed powers to which they had no right, the Council would be able to go before Parliament. The only way to bring this question to a final decision was to give power to one united body, and let it take the responsibility of drafting a plan which would suit all interests, and then ask Parliament to approve of it. He was satisfied that if Parliament would confer this power on the Council, they would use it speedily; and he trusted they would do so in a way which would be a benefit to the public at large. But they felt very strongly that if they were interfered with in the freedom of choice—if they had not the discretion which Sir W. Harcourt's Committee said should be given to the Water Authority—they felt that it would only lead to trouble, disaster, and delay. So much was this the feeling of the Council, that he did not even ask the Committee to recommend that they should be the power to arrange by agreement with any Water Company without afterwards seeking parliamentary sanction. He trusted that the Committee would see fit to recommend that the Council should have power to make provisional agreements with all the Companies; but he did not ask for anything that would not require parliamentary approval. If the Committee would be content] to take a step which was gigantic in its real effect (though, looked at cursorily, it might not appear to be much) of selecting the Council as the Water Authority, empowering them to prepare schemes and bring them before Parliament, and to form the Statutory Committee of the Council and the Corporation, they would, he contended, advance the question greatly and in the right way. They would have taken a step which not only need not be retraced, but which would be a very great advance in the way of settling, on a permanent basis, this important question of water supply, which affected so many millions of people.

Mr. Balfour Browne, on behalf of the Hertfordshire County Council, said that at present the "shell" of the Bill was that of the Vestries, but the body in it was that of the London County Council and the City Corporation; and he should ask the Committee to give it decent interment. At the present time the two Water Companies supplying the Hertfordshire district were the New River Company and the East London Company. It was too perfectly true that in none of their Acts was there any restriction of their powers; but there was a limitation of their district. These Companies would never want to take more water than was required in their own area; so that practically there was a limit if the supply remained in their own hands. But if the undertakings passed to the County Council and the Corporation, their district would become that of the whole of London; and the result of continuing to draw from the wells in increasing quantities might be to pump Hertfordshire dry. If the powers of the Company were transferred, he asked the Committee to provide that there should not go with them an unrestricted right to draw water from Hertfordshire. With regard to the proposed inquiry into new sources of supply, he contended that it should be held by an entirely independent person or body, and not by the County Council. The Board of Arbitration constituted by the Bill would inquire into the value of the undertakings to be transferred; and this would depend upon various matters—in the first place, whether or not they had the water to supply; secondly, was the plant in a fit condition to supply it. If the plant was not in good repair, the purchase-money would be so much less. All this would be inquired into on the arbitration; but the Arbitrators would have no power to consider the question whether or not it was contrary to public policy that these two Companies, or the body to whom they were transferred, should be allowed to take water from Hertfordshire. This must be decided by Parliament; and he asked if it would be unreasonable for them to suggest that, until further inquiry had taken place, the Committee should issue, as it were, an interim injunction, and say that no more water than was at present being taken should be drawn away from the wells in the county. If they did this, they would keep things *in statu quo;* and the people of Hertfordshire would not be injured—at any rate, until the inquiry had been held. When this took place, he hoped they might be able to prove his case before the constituted tribunal, as they were prepared to prove it before the Committee; and then justice would be done.

The Committee then adjourned till the following morning.

The Position of the Madrid Gas Company.—English gas engineers may find a difficulty, says the Madrid correspondent of *Industries*, in understanding how a Gas Company who sell gas at 9s. per 1000 feet, and coke at 45s. per ton, are unable to offer their shareholders a larger dividend than 3¾ per cent. There is no place, perhaps, where gas lighting is more used than in Madrid. The explanation of this anomaly is, he adds, that the Company pay so very high a rate of interest to the debenture-holders. The results for the present year are, it is stated, likely to be even more unfavourable than those of the year 1890, as many persons now use the electric light instead of gas, even at the high price of 1s. 3d. per unit.

LEGAL INTELLIGENCE

COURT OF JUSTICE.—CHANCERY DIVISION.

Friday, July 3.

(*Before Mr. Justice* Kekewich.)

Paterson and Others v. Mayor and Corporation of Nottingham.
Th Liability for Receivers for Gas and Water Supplies.

To-day an application was made on behalf of the plaintiff, who is Receiver and Manager of the works and premises of Messrs. Lindley, Wright, and Cox, of Nottingham, and also on behalf of the Debenture Corporation, Limited, and the Mortgage and Insurance Corporation, for an injunction to restrain the Mayor and Corporation of Nottingham, as owners of the gas and water works, from cutting off the supply of water to the plaintiff's works and premises. The notice of motion originally related to water only; but it was amended so as to include the supply of gas.

Mr. Renshaw, Q.C., appeared in support of the application; Mr. Warmington, Q.C., represented the Corporation.

Mr. Renshaw stated that the works and premises which were threatened to be deprived of water employed something like 600 hands. Mr. Paterson was appointed Receiver on the 5th of June; and a few days afterwards, he had a demand from the Corporation of Nottingham for £182 2s. 3d. for water supplied to the Lady-day preceding, with an intimation that, if the amount was not paid, the Corporation would, under their statutory powers, cut off the supply. Mr. Paterson wrote to the Corporation, stating that he had only just been appointed, and offering to be responsible from that day for any water consumed. He also tendered £20 as deposit; remarking that he was prepared to increase the amount if the Corporation thought it necessary, and pointing out that it would be a most serious thing if the water were cut off. The learned Counsel argued that under the Acts the persons liable to pay the arrears were the mortgagor Company, and that under Mr. Paterson's appointment a new tenancy had been created.

Mr. Warmington submitted that the Receiver was the agent of the mortgagors, and that practically this was an application to restrain the Corporation from exercising their statutory powers to cut off the water supply. He asked the Court not to interfere in the matter.

Justice Kekewich, in giving judgment, observed that receivers did not usually take initiative steps in a matter of this kind; and he thought the rule was so sound and convenient that he ought to abide by it. Mr. Paterson was appointed by Mr. Justice Stirling on the 5th of June last, at the instance of the Debenture Corporation, Limited, and the Mortgage Insurance Company, Limited, in an action in which Messrs. Lindley, Wright, and Cox were defendants—a debenture-holder's action. It was said, on behalf of the defendants, that Mr. Paterson was only Messrs. Lindley, Wright, and Cox, Limited, in another shape. He considered this was going too far. Mr. Paterson was the officer of the Court; he was responsible to the Court, and gave security to the Court. He thought it was inaccurate to say that Mr. Paterson was simply the agent of the mortgagor; but still he (his Lordship) could not regard him as a new person coming in. He had no title whatever of his own; and his coming in certainly did not, in any sense, constitute a new tenancy, although it might constitute a new personal occupation. To his mind, therefore, Mr. Paterson was no proper plaintiff. Then why should the Debenture Corporation, Limited, be proper plaintiffs? They, he understood, were mortgagees, holding debentures creating a charge over the property. They had not taken possession themselves, but had obtained an order of the character he had mentioned; and there had been no attempt whatever to interfere with their rights, because at present they had none. It seemed to him—and it had done so from the time the motion was mentioned in the first place—that it failed on the ground that he had not a proper plaintiff before him at all. But this was not by any means the only objection to the motion. He would take the water case first. The Water Act of 1845 * provided, in section 75, that "if any person supplied with water by the Company, or any person liable as herein provided to pay the water-rate or rent, remuneration, or other charge to the Company, shall neglect to pay such water rate or rent, remuneration, or other charge due to them at any of the times of payment thereof, it shall be lawful for the Company or their lessee to stop the water flowing into the premises of such person." Neither Mr. Paterson nor the Debenture Corporation were persons who had been supplied with water—he was speaking only of the period before the 5th of June; the water was supplied to Messrs. Lindley, Wright, and Cox, Limited, and to no one else. They therefore were the persons who were liable to pay. What the Corporation were proposing to do was to cut off the supply to the premises of Messrs. Lindley, Wright, and Cox, Limited, to whom the water was supplied and who were the persons liable to pay for it. He did not see how the plaintiffs could properly complain of this. Exactly the same words were to be found in section 40 of the Gas-Works Clauses Amendment Act (34 & 35 Vict., cap. 41). If his criticism of the water case was sound, it held good as regarded the other Act *in pari materia*. He thought therefore that the motion failed. Then it was said that an injunction was obtained *ex parte*, without full discovery of the facts of the case at the time. It seemed that, on the day on which the order was obtained, the Corporation had given an undertaking which rendered the application necessary. He was extremely jealous of the necessity for accuracy and the most complete *bona fides* in these cases; and he was not by any means prepared to say that, if an undertaking had been given in Nottingham, knowing the means of communication which now existed, that undertaking ought not to have been communicated to the Solicitors and Counsel in London in time to prevent the application that was likely to be made within a reasonable time afterwards. But he was not sure that there was any culpable delay; and therefore he did not press this matter further. The motion would be refused; costs to be the costs of the defendants in any event.

* This is the old Water Company's original Act, 8 & 9 Vict., cap. 19.

NEWCASTLE ASSIZES—SECOND NISI PRIUS COURT.

Tuesday, July 7.

(*Before Mr. Justice* GRANTHAM.)

The North Shields Water Company's Charges.

The plaintiff in this case is the occupier of a house at Tynemouth; and the action was brought in order to try the question of the amount which he and others were liable to pay in respect of water supplied them by the defendant Company. The claim, the hearing of which had been removed from the North Shields County Court by writ of *certiorari*, was for 7s. 11d.; but the question affected the revenue of the Company to the extent of £1200 per annum. Shortly, the plaintiff's claim was that he had been charged upon the actual rent which he paid for his premises, without any deduction in respect of the annual average cost of repairs and insurance. In the poor-rate books for the district, the rateable value of his house was stated as £21 15s.; the gross estimated rental being £26. Plaintiff paid on the higher rate, but under protest. He contended that the annual value of his house within the meaning of section 37 of the defendants' Act was £21 15s., and that the water-rate payable by him for each quarter amounted to 8s. 2d. and not more—this being one fourth of a sum of £1 12s. 8d., the amount arrived at by taking 1s. 6d. in the pound on the sum of £21 15s. The question was whether the Company were entitled to assess the water-rate upon the gross annual value or the net annual value. If they were entitled to assess on the gross value, Mr. Spencer was wrong; and if they were bound to assess on the net value, he was right. The difference between the gross and the net was that the former was the actual rent paid—the gross annual value—and the net was the actual rent, *minus* the average cost of repairing and insuring the house, and the expenses necessary to command the rent.

Mr. J. L. WALTON, Q.C., and Mr. J. STRACHAN, appeared for the plaintiff; Mr. TINDAL ATKINSON, Q.C., and Mr. W. S. ROBSON, for the defendants.

On behalf of the plaintiff, it was maintained that the annual value must be the net and not the gross value—value meaning the result left after the expenses necessary for the purpose of realizing that result had been deducted; and in support of this the case of *Dobbs v. The Grand Junction Water Company* was cited. After considerable argument, Counsel for the Company said it was absolutely impossible to distinguish between the Dobbs case and the present one.

His LORDSHIP said he had very little difficulty in dealing with the case; and he gave judgment for the plaintiff, with costs.

MIDDLESEX ASSESSMENT SESSIONS.

Westminster—Saturday, July 4.

(*Before Mr.* R. LOVELAND LOVELAND, *Chairman, and a Bench of Magistrates.*)

The Assessment of the Colney Hatch Gas-Works.

As briefly mentioned in the JOURNAL last week, the hearing of the appeal of the Colney Hatch Gas Company against the assessment of their works in the Edmonton Union was taken to-day. There was also an appeal against the assessment of the Company's property in the Friern Barnet Union; but it was arranged that this should stand over till October.

Mr. POLAND, Q.C., and Mr. BOXALL appeared for the appellants; Mr. CASTLE, Q.C., for the respondents.

Mr. POLAND said the appeal was by the same Company who appealed against the assessment of the parish of Friern Barnet in November last.* That appeal was heard and determined in due course upon the state of things which existed up to that time on the accounts for 1889, when it was established to the satisfaction of the Court that there should be a considerable reduction in the rating of the appellants' property in that parish. They had hoped that the decision in this appeal would have rendered unnecessary further litigation in regard to other parishes; but, unfortunately, this had not been the case. There was a rate made for the parish of Edmonton in October, 1890. Of course, with regard to it the accounts for 1890 were not completed; and therefore the rate had to be made upon the figures as far as they were known up to that time. There was an appeal upon that rate; but, unfortunately, owing to the difficulty of arranging with the Committee, and thinking the matter would be settled, the Company were obliged to abandon the appeal in consequence of an arrangement not having been come to. In April of the present year a fresh rate was made, which was the one now appealed against. Originally the rating was upon the lands, buildings, gasholders, mains, appurtenances, pipes, and services, all put together, at the gross value of £1230, and the rateable value of £1025. The Assessment Committee, however, afterwards thought it better to divide the amount, as all the works were in the parish of Edmonton; and in the valuation list they had separated the amount in this way: They had amended the description to "lands, houses, offices, buildings, gasholders, plant, and appurtenances, £780 gross, and £635 rateable value;" and he was happy to say that, so far as this amount was concerned, the appellants were satisfied. The only question which had to be tried, therefore, was as to the remainder, which was put at £430 gross, and £390 rateable. Although this was a small amount so far as the parish was concerned, the case was an important one to the Company, because if the figures were right, they would affect the rateable value in the other parishes in which the Company had property. The result of the valuation which had been placed before the Court for the purposes of the appeal showed that, taking the works and lands at £635, they came to the productive portion of the mains and services, which was put at £420; making the rateable value £1055. If this calculation was right, the portion for the parish of Edmonton was £167; making, with the £635, a total of £802. On the last occasion he called before the Court Mr. H. E. Jones, a gentleman of great skill in these matters, and also Mr. Cash and Mr. Ryde; and he was going to adopt this course on the present occasion. So far as they had been able, they had made up the valuation upon the accounts of 1890, and had, of course, regarded the fact that a tenant would be in with his experience up to the time the rate was made; and they said that these accounts should be to some extent amended, as they had to take into consideration any increase there might be in the price of coal or labour. A prudent tenant, coming in at the beginning of the year, must look forward to all the risks that were likely to occur in carrying on a business of this kind. The witnesses would show that the valuation of the Company was substantially a correct one; whereas the one made on the other side was very meagre. One of the questions which arose in these cases was what was to be allowed for occupier's capital; and then there would be the usual controversy with regard to the amount necessary to maintain the premises in a state to command the rent. But in the respondents' case there were one or two mistakes. For instance, with regard to rates, he saw that they put down 6s., instead of the actual sum of 7s. 2d. in the pound. There was no "Royal road" to arriving at the true rateable value; but the Court would have to consider both sides of the question—taking a broad view of it, and doing, as he suggested they had so often to do, rough justice in deciding what was the proper sum as between the parties who were not able to agree. They had taken out the average from Mr. Field's "Analyses;" and it worked out to about 1·88d. per 1000 cubic feet of gas sold, whereas their assessment worked out to 4·09d. This could not represent the true state of things; and it would be for the Court to say whether the appellants or the respondents were right, or whether the true figure should be something between those given on either side.

The CHAIRMAN asked whether the £167 was based upon the old calculation, or upon the decision in the previous appeal, when the reduction was to £117 net.

Mr. POLAND said there was no judgment given in that case; but, of course, the appellants had endeavoured, as far as they could, to act upon the result of that decision. The rating was for the year, and each year depended upon its circumstances. They had now the accounts made up to the end of 1890; and starting with these, they modified them, to see whether they were a fair test of what the value would be in the future.

Mr. *H. E. Jones*, M. Inst. C. E., was then called, and Mr. BOXALL was proceeding to examine him, when

Mr. CASTLE said, before Mr. Jones gave evidence, he should like to know how far the parties were bound by the previous decision of the Court, as the respondents were not parties to it. He did not wish to reopen questions if he could avoid it; but there were certain circumstances which justified them in defending this rate.

The CHAIRMAN said he did not think the decision in the previous case would bind the present one.

Mr. CASTLE observed that, on the other hand, he did not think the Magistrates were going back on that decision, unless they had some reason for it.

Examination continued: He gave evidence in the appeal of the Colney Hatch Gas Company against other parishes on the previous occasion. He had made a valuation of the works and plant of the Company; and he found that the assessment for rates and taxes, on the face of the accounts, amounted to 4d. per 1000 cubic feet of gas sold. This was so abnormal that it arrested his attention; being nearly three times as much as any other Company was paying with which he was connected. The average of a number of Companies whose affairs he had investigated was about 1½d. The Colney Hatch Company paid last year at the rate of 7s. 2d. in the pound, which was somewhat high. But the real difference must be in the amount of the assessment. His valuation showed that the true assessment in Edmonton should be: For the works (on which they were agreed), £635; for the mains in the district, £204. The Company supplied a large and straggling district over a very wide area; and in this respect it was not a profitable undertaking compared with the Metropolitan Gas Companies, with whose rates he had been comparing them. As to the prices that were being paid for coal and iron, there was great disturbance in the markets for coal, iron, and fire-clay, as well as in all the elements which entered into the expenditure of a gas company. The price of coals in the Tyne went up during last year 100 per cent.; iron, 40 per cent.; and fire-bricks, 15 per cent. All these things were well known last year, and also the year before. They came really at the close of 1889; so that they were well known at Christmas of that year. A tenant taking the works, if he knew anything about gas, would be well aware of the rise in the market value. The wages, too, had been disturbed to the extent of 50 per cent.—the hours having been reduced from twelve to eight; and the hope that existed that the men would do a little more work in the eight hours had not been realized. The result was that they were now paying three men to do the work that two did before. The gross receipts for the year 1890 were £10,344 for gas, meters, stoves, and residuals. From this sum he took off £158 for rents of property which were separately assessed outside the Company's undertaking; leaving £10,186. The total expenditure was £7120, from which he deducted the expenditure on the property separately assessable; bringing it down to £7025, and leaving a balance of £3151. Last year the law expenses were £300, which he thought an abnormal sum which was not likely to continue; and as probably not more than half this would be the average amount for some years to come, he deducted £150—or rather he added it to the net balance, bringing it up to £3301. He also deducted the difference between the old and the new rates and taxes—the difference between 6s. and 7s. 2d. in the pound. As to the tenant's capital, he took it at £5008; the valuation of the loose plant, tools, and utensils about the works was £650; and the meters and stoves in the district were worth £2742—making the total tenant's capital £8400. Upon this he had made the usual allowance of 17½ per cent., which worked out at £1470; leaving £1841 for the landlord's gross share. He allowed for insurance and sinking fund, renewal of buildings, plant, mains, and services, £474, which was calculated upon the 4 per cent. table, which, his own experience and that of a large number of engineers with whom he had been working for some years, showed was the proper basis. Taking the insurance at ½ per cent. on the buildings and plant, that gave £66; making a total deduction of £540, or equal to about ⅓ per cent. of the total cost of the works. This, he thought, would speak for itself. In that way he arrived at the net balance of £1301. But it required correction as to

* See JOURNAL, Vol. LVI., p. 954.

the rates, which had been charged on the old figures. The difference would be about £125; making the assessment £1246 for the year 1890. The coals in that year had not reached anything like the average price which, he believed, the Company must pay for some years to come. They had been paying 13s. 9d. a ton in 1888.

Mr. CASTLE: As a great deal turns upon the question of coal, I think I must have strict proof of this. I must see the contracts.

Witness: Yes; that is quite right. I am giving my opinion; but I think the contracts will be shown.

Mr. BOXALL: Are you able, from the published accounts of the Company, to ascertain the actual price that has been paid for the coal.

Witness: Yes.

Mr. CASTLE: Although we have been accustomed to allow these things to go without dispute, I must in this case ask to see the contracts, and ascertain for how long they have been made. The Engineer can easily give them to us.

Witness: The contracts will bear out what I say.

Mr. POLAND; It is subject to verification. I will call the Secretary.

The CHAIRMAN: You can get this out on cross-examination, Mr. Castle. He has not the contracts.

Mr. CASTLE: Then I object to the evidence. When I get the contracts, I shall show that he made a very great mistake on the last occasion.

The CHAIRMAN: What Mr. Jones can say is this: I have seen the published accounts, and, for what it is worth, that is what I take from them. If they have no better evidence than that, it will be for you to comment upon it, or to deal with it in cross-examination.

Mr. CASTLE: If my friend will hand me the contracts now, so that I may look at them, I can follow the witness.

Mr. POLAND: They are not in Court. I will call the Secretary, who will give full information.

Mr. CASTLE: In the meantime, I object to this evidence being given; but, *de bene esse*, it may be taken for what it is worth.

Mr. POLAND: There are no formal contracts. The way in which the Company arrange is this: A letter is written and a price agreed upon. That is carried out by the delivery of the coal and payments by the Secretary, who has the book here, and can give my friend the proper information. If required, we will produce the actual letters; but I hope this will not be necessary.

The CHAIRMAN: Assume for the moment that there are no figures whatever. This gentleman has the right to give an estimate; and you, Mr. Castle, will have the right, in your reply, to ask the Court not to place any reliance upon the estimate, because you have shown in evidence that it is wrong.

Mr. BOXALL (to witness): Have you made an estimate of what is likely to be the advance in coal?

Mr. CASTLE: I object to that.

The CHAIRMAN: I think that is going too far. We are trying what really were the figures during this period of the year.

Mr. CASTLE: And this gentleman is going to give evidence of a risk which I should argue, if it is going to exist, is covered and provided for by the 17½ per cent.

Mr. POLAND: The witness is largely experienced in the price of gas coal; and he would say that a prudent tenant would have to consider that he would have to pay an increased price for it for the following year. Therefore, to that extent, he is entitled to give the evidence.

The CHAIRMAN: Yes; what would a hypothetical tenant, having regard to all the circumstances of the case and to the probabilities of the price of coal going up, estimate in his own mind? It would be evidence to that effect, no doubt.

Mr. POLAND: What do you say, Mr. Jones?

Witness: I estimate that for five years from this date the Company will pay 2s. 6d. a ton more than they have done in the preceding five years, or than is shown in the accounts. I estimate that they will get 6d. of this back in the advanced value of the residual products. That gives a total net increase, abnormal to this Company, of £384 on the year's tonnage of coals. Of this, as between the years 1889 and 1890, they have already realized an advance of £85; and as a tenant, I should calculate that another £299 a year must be expended in coal for the next two or three years. I estimate that they would also have to spend an extra £70 a year consequent on the rise in wages; making together £369, which reduces the £1426 to £1057. Correcting this by the reduced rates, would add £98—raising the total to £1155. Allowing £635 for the station and works, there was left £520 for the mains. Working this out by the proportion of receipts for the parish of Edmonton, it would give a rateable value of £204. Supposing no allowance were made for the additional cost of coals and wages, it would be £314.

Mr. CASTLE: I see you realize where the pinch of the case is when you say that, if no allowance is claimed for a future rise in coal, the rateable value would be £314, instead of £204. Not making any deduction for this, the total estimate for the whole, before subdivision, is £1426, while we make it £1451. That is getting pretty near; and I do not suppose the Court would disturb the valuation for a matter of £20. Therefore, if they are wrong in their estimate as to the coal, their case is gone.

Witness was cross-examined by Mr. CASTLE as to whether he did not, on the last appeal, give an estimate as to the rise of £445 in the price of coal, and of £113 in labour, whereas the 1890 accounts showed that, in actual practice, it had worked out at £85 only. In reply, he said that at the time he could not foresee that the coke would bring so large a part of the enhanced price of coal back again; and he could not quite predict how far the coals in stock, which had been bought at the old price, would reduce the amount. The figures which the learned Counsel had been quoting were not given by him (witness), but by Mr. Cash; and he did not think it was quite fair for Mr. Castle to put them upon him as he had done. Asked if last year was not an exceptionally heavy one, and if this year the price of coal had not fallen, the witness replied that it had done so a little, but that the reduced prices had not yet come into operation. Future contracts were taken at a little less.

Mr. CASTLE asked if, according to Mr. Field's "Analyses," the average cost per 1000 cubic feet of gas for maintenance, repairs, and renewal of mains did not work out at 4d. for the Metropolitan gas undertakings, whereas the Colney Hatch Company it was 9d.

Witness said that the London works were a hundred times as large as those of the Colney Hatch Company; and the allowance did not include reproduction or depreciation charges. He made the figures come out for these concerns at 2·88d. for the works, and 2·33d. on the distribution plant.

Mr. CASTLE said, if it was less than 6d., he should not quarrel with it; but if it was more, he certainly should do so. However, he would have the figures worked out, and see which was right. With regard to tenant's capital, he asked witness what he considered was covered by the 17½ per cent. allowance.

Witness said it covered the trade interest. As this was a large business of selling the manufactured article, it covered the trade interest apart from the rent of the premises; and as this only worked out at 14 per cent. of the gross receipts, it seemed to him to be a very moderate figure. He agreed that of the 17½ per cent. 5 per cent. was for interest on the capital, 10 per cent. for trade profits, and 2½ per cent. for risks and casualties; but he did not consider that the latter was to include the risk of a rise in the price of coals and labour. It was to cover such things as compensation for explosions, accidents to workmen, and all that kind of thing, for which they were constantly paying out money. Including the £815 for repairs and £540 for renewals, he admitted that the figures would come out at 8½d. per 1000 cubic feet, as against 4d. or 4½d. in Mr. Field's book; but those quoted there—both the Metropolitan and Surburban Companies—were all much larger concerns than Colney Hatch. In regard to the meters, he had taken them at the new price, and not at the old figure, because he considered them of maximum efficiency for a going concern.

Mr. *Cash*, Engineer and Manager of the Brighton and Hove Gas Company, in answer to Mr. BOXALL, said he was examined as a witness on the occasion of the appeal by the Colney Hatch Gas Company against the assessment made by the parish of Friern Barnet in November last. His valuation was: Total receipts, £10,186; expenditure, £6692—giving a profit of £3494. For the occupier's share for working capital, he allowed £4928; value of meters, £2743—taking the cost price, because they were worth the same money to the Company as new meters, and earned exactly the same amount. For utensils he allowed £650; making the total £8321. Upon this he had taken the usual 5 per cent. for interest; for trade profits, 10 per cent.; and for risks and casualties, 2½ per cent.—amounting together to £1456. This reduced the £3494 profit to £2038. As a statutable deduction for renewal of works, he allowed £692; and for insurance, £76—bringing the total rateable value out at £1270. These figures were according to the accounts for 1890. This rate being one made in April, he had deducted £201 for increase in the cost of coal for the year 1891. In his judgment, this was a perfectly fair sum to allow for the increased cost of the coal as compared with what appeared in the accounts of the Company for 1890. For the increased cost of labour, he deducted £90, less a difference of £76 in rates and taxes; making £215. Deducting this from the £1270, made £1055 as the total rateable value of the property as a going concern. He had taken the works and lands at the agreed sum of £635; leaving £420 for mains and services. Allocating the share of this to Edmonton according to the gas-rental received in the parish, it made the rateable value £167 for mains and services.

Witness was cross-examined by Mr. CASTLE as to the figures he gave last year for the probable increased cost of coal and labour, amounting to £445 and £113. He said these figures must be corrected by the state of things which existed in that year. In 1890 they could buy cheap coal the first six months, and dear coal the rest of the year. He had not taken into consideration the increased price of residuals.

Mr. CASTLE: Therefore the estimate was wrong by £400.

Witness: I must dispute that, for this reason: If you take my figure of £445, which is the correction of 1889, you must deal with the cheap coal which existed in the first half year of the 1889 accounts.

Re-examined by Mr. POLAND: On the previous occasion he dealt with the actual contracts—with what the Company had paid—and corrected them for what would probably have to be paid for 1890. The rise in residuals, which last year fetched one of the highest prices ever known, left them with a net increase, which was an accident.

Mr. *E. Ryde* said his valuation was not in exactly the form adopted by the previous witness, but was prepared as a land surveyor would make it out, and as he had done it for 50 years. He took the receipts at £8463. He obtained the cost of coal from the contracts, and added 1s. 0½d. per ton increase, which would amount to £3221. Deducting the purifying materials, £180, this would be reduced to £3041. He also deducted the residual products; leaving £1779 as the net amount. The other items of expenditure he had taken from the accounts, except those of labour, wages, and gratuities, to which he added 15 per cent. Law expenses were put at the arbitrary figure of £200, as the Company's appeals would have to be paid for; and he thought this was a fair sum. He put down £300 for maintenance, repairs, and renewals; and as to the rates and taxes, he had taken them at 6s. 9½d. instead of 7s. 2d. But it would only make a difference of £20, whether the one figure or the other were adopted. This left the net receipts at £3641, of which he gave £1348 as belonging to the tenant; leaving £2293 as the gross estimated value of the works in their entirety. The statutable deductions came to £1112, which brought out the value of the whole concern at £1181. The difference between his figures and those given in the case submitted by the respondents was more than accounted for in the increased cost of coal and labour, for which he had estimated £201 and £91 respectively. The result of his valuation was that for the parish of Edmonton, taking the agreed figure of £635 for the works, the rateable value for the mains and services was £217.

Mr. *W. H. Hardy*, F.C.A., Secretary of the Company, said the average of the rates for the year 1890 was 7s. 2d. in the pound. He had sent for the book containing the particulars of the coals; and, subject to his evidence being verified by it, he stated that for 1890 the contract price paid by the Company was 13s. 9d. per ton for the first half of the year, but that from the 1st of July they had paid 17s. 2d. per ton. The average for the year was 15s. 8·72d., or they might call it 15s. 9d. The price of 17s. 2d. was continuing. The fresh contract had not yet been made; but he expected it would be completed in a few days, when he hoped there would be some reduction.

Cross-examined by Mr. CASTLE: The Company had no sealed

contracts for coal, but he could show the charge by the invoices. In the last case the contract was made for twelve months; but the previous one was for two years. The present contract expired on the 1st of July; and at present no arrangements had been made for a reduced price. They were now drawing from the stock.

This was the case for the appellants.

Mr. CASTLE stated that he should not call any witnesses on behalf of the respondents.

Mr. POLAND then summed up his case; stating that he had hoped to see in the witness-box Mr. Castle, the valuer, and other gentlemen who were sitting at the table, and to have had the opportunity of asking some qnestions upon the figures given in the case put before the Court by the respondents, for which these gentlemen were, no doubt, responsible. He suggested that this was, on the face of it, an unsatisfactory valuation; and, being so, no one was called in support of it. He, however, relied upon the judgment formed by the skilled witnesses who had been called; and though their figures might not be altogether absolute, as no figures would be, he was certain that the Court would do justice—guided by their experience, and taking a broad view of the matter—and decide that the figures which he had put forward were much nearer the truth than those submitted by the respondents.

Mr. CASTLE said the whole case turned upon whether the witnesses were right when they claimed to make an allowance for the future rise in the price of coal; and if their case failed on this point, it failed altogether. Last year, on an appeal relating to another parish, when the whole of the facts were before the Court, and witnesses were called on both sides, the Court made a very considerable reduction. This was based upon the claim by the witnesses for the other side of £445 for the increased price of coal, and £113 for labour; making together £558. But at the end of the year, when they had the figures for 1890, they found that the £558 was broken down in two ways. In the first place, it never amounted to more than half that sum; and then, *per contra*, there was a rise in the price of coke—the consequence being that there was only £34 to come off. Mr. Jones had said very fairly that he was not aware, when he gave evidence before, that there would be such a rebate for the increased price of residuals. But why was he not told it? The information was known to the Company, because they were actually at the time drawing this additional revenue from their coke. He also contended that the increased price for coal was intended to be included in the 2½ per cent. for risks and casualties. It was for the appellants to show that the valuation was wrong; and he maintained they had failed to make out any case for a reduction.

The CHAIRMAN announced that there would be a short adjournment, to allow the Bench to consider their decision.

On the reassembling of the Court,

The CHAIRMAN said: During the adjournment, we have all put our pencils together, and have arrived, I am glad to say, at a unanimous conclusion in regard to this rating. The rateable value of the buildings is agreed at £780 gross and £635 net. With regard to the residue, we are of opinion that the proper rating should be £325 gross and £265 net. The appellants will have the costs.

Mr. CASTLE: I should point out that we have been practically successful.

The CHAIRMAN: No; you have not. Your case is that the figure should be £390, and the Court have come to the conclusion that the proper net rateable value is £265.

GREENWICH POLICE COURT.—Wednesday, July 8.

(*Before Mr.* G. G. KENNEDY.)

Conviction of the South Metropolitan Gas Company for Supplying Gas of Deficient Illuminating Power.

To-day the South Metropolitan Gas Company appeared in answer to two summonses taken out by the London County Council for supplying gas of less illuminating power than it ought to be under the Company's Special Act, whereby they had rendered themselves liable to penalty.

Mr. C. A. ROBERTS appeared for the County Council; Mr. WASHINGTON defended the Company.

Mr. *S. Hoare Collins*, Gas Examiner at Lewisham Road testing-station, deposed to testing the supply of gas on June 19, when he found it to be of 15·29, instead of 16 candle illuminating power. On June 20 he again made a test, and found the gas to be only 15·43-candle power—virtually 0·6 of a candle deficient.

Cross-examined by Mr. WASHINGTON, witness said that the station was some distance—perhaps a mile, or even more, or it might be nearly two miles from the gas-works. He made the tests when gas was being generally used; that was to say, not in daylight. The lamps in the streets were alight at the time. He took charge of the testing-station on the 1st of April, and had before that tested gas, acting for other Examiners in their temporary absence.

Mr. WASHINGTON submitted that the test was not reliable, even in the opinion of the Council, as shown by a letter which he had in his hand from the Clerk (Mr. De la Hooke).

Mr. ROBERTS said it was admitted that the candle was an unsatisfactory standard; but it was as fair to the Gas Company as to the consumer.

In further reply to Mr. WASHINGTON, witness said that Mr. Hehner was the tester at the Lewisham station before him, and had been there for several years. He did not know if there were any complaints in Mr. Hehner's time.

Mr. KENNEDY pointed out that Mr. Washington could not resist a conviction.

Mr. WASHINGTON admitted this; but said the Company had done their best, and were still doing it. There was no complaint at the Lewisham Road station during the time Mr. Hehner was the tester. He was exceedingly sorry that the law was bound to regard a test where even the prosecutors said they could not prove if it was right or wrong. He would read a letter, dated June 18, from the Clerk of the County Council.

Mr. ROBERTS said he had personally no objection to the reading of the letter, but it had no relation to the present case. It dealt generally with the testing of the South Metropolitan Company's gas. If one letter was introduced, there would be no end. The Company must abide by the law as it stood.

Mr. WASHINGTON, by permission of the Magistrate, then read the letter, which was a long document, expressing the opinion that the candle was unsatisfactory as a unit of light, and inviting the Company to take part in a conference in the Government Department, with a view to an alteration. Mr. Washington added that the prosecutors said that, whether the test was right or wrong, they asked for a penalty. Under the Act, he knew, the certificate of the Examiner was final; but Mr. Vaughan recently expressed his opinion of this by fining a Gas Company 5s. merely. The Magistrate had power to limit the penalty.

Mr. ROBERTS said that other Magistrates had imposed the full penalty; and recently there was a case where the Company summoned were fined £100.

Mr. *H. Colebrook*, gas tester to the defendant Company, in reply to Mr. Washington, said he had been at the works for 13 years, and used a duplicate of the instrument employed by the first witness. The works were situated at Thames Street, Greenwich, about 1¼ miles from the testing-station. On June 19 he took tests at the works, where the gas passed into the main. He took three—at 10 a.m., 1.30 p.m., and 6.15 p.m. The respective tests were 17·6, 17·08, and 17·82 candles—each considerably over 16 candles. On the 20th of June he took two tests—one at 10 a.m. and another at 1.30 p.m. The former was 18·1, and the latter 17·68 candles.

Mr. ROBERTS pointed out that the two witnesses' tests were taken at different times.

Mr. KENNEDY fined the Company 20s. in each case, with 25s. costs.

Sale of Shares.—At Bolton last Thursday, a number of shares in the Farnworth and Kearsley Gas Company were offered for sale by public auction. A parcel of £300 of consolidated stock "A," paying a dividend of 10 per cent., was sold for £805; and £595 of stock "B," paying a dividend of 7 per cent., realized £940.

The Conveyance of Gas-Works Residuals by Rail.—Our readers are doubtless aware that a Joint Committee of the Houses of Lords and Commons have been engaged for some time in settling the rates and charges for the conveyance of merchandise by rail. Last week they inserted in a Provisional Order applied for by the London and North-Western Railway Company a clause specifying that the Company are not to be required to provide trucks for the conveyance (among other things) of "ammoniacal liquor, creosote, coal tar, gas tar, gas water, or gravel tarred for paving," when these articles are carried in such a manner as to injure those trucks.

Gas v. Electric Light in New York.—For 40 years prior to the introduction of electricity for lighting purposes in New York City, the increase in the consumption of gas averaged about 10 per cent. per annum, while the population doubled every 17 years. Since the adoption of the electric light, however, the increase has been much more rapid. It almost immediately rose to 12 per cent. per annum; and in 1887 it was equal to about 14 per cent. per annum. This ratio was still further exceeded in 1888-9-90. The output of gas in New York is doubling itself now in a period of 6½ years instead of 10 years. The President of the Standard Gas Company thinks that one reason for this very rapid increase is the fact that the electric light has educated the human eye to require more light; and that people are not satisfied with the quantity they formerly regarded as sufficient.

Gas Exhibition at Glastonbury.—Last Wednesday morning an exhibition of gas appliances, held under the auspices of the Glastonbury Gas Company, was opened in the Assembly Rooms in the town, under the direction of the Manager (Mr. J. H. Hopper). It was inaugurated by the Mayor (Mr. J. Brock), who, in the course of a few appropriate remarks, said he thought great credit was due to the Company, and especially to Mr. Barker, one of the Directors, for organizing it. They had also to thank Messrs. Unsworth and Richmond, Limited, of Warrington, for showing the excellent assortment of cooking-stoves and heating appliances they had on view. In addition to these there was a capital display of lacquered fittings, by Messrs. J. Russell and Co., of Bristol; cooking utensils, by Mr. Godden, of Glastonbury, glass-cased meters (in operation) by the Gas-Meter Company; "Meteor" lamps, by Messrs. H. Greene and Sons; and gas-washers, by Mr. J. Greenall, of Manchester. On the second day of the exhibition, the Chairman of the Company (Mr. J. Porch) introduced Mr. E. W. T. Richmond, who delivered a suitable address to a numerous audience. The exhibition was open four days; and during its continuance, Miss Thwaites, of Liverpool, gave cookery lectures which were well attended, as was the exhibition—some 2000 people having visited it.

Excursion of the Dover Gas Company's Employees. — Last Wednesday the Directors of the Dover Gas Company gave their workmen, with their wives and children, an outing to the Crystal Palace. The party left Dover at 6.45 a.m., and arrived at Penge about 9.30. About noon the company—numbering 150—assembled for dinner in one of the refreshment rooms; and afterwards the Picture Gallery and other places of interest were visited. At four o'clock, the majority of the party attended the marvellous performance of trained wild animals, tickets for which were presented by the Directors. Tea was served at five o'clock; and subsequently the Chairman (Mr. W. Mannering) expressed his pleasure at seeing the men and their wives present, and enjoying themselves as they evidently were. He spoke of the general prosperity of the benefit and recreation funds; and then said he trusted the men would continue to carry out their work in the same satisfactory manner as they had done in the past. Mr. R. Herring, the Manager, gave some details concerning the funds alluded to by the Chairman—stating that in three-and-a-half years, the income, including gifts, had been £630; and that the library now contained 279 volumes. Nearly all of the latter, it may be parenthetically mentioned are profusely illustrated; and from his experience, Mr. Herring finds these most suitable for works libraries. Hearty cheers were subsequently given for the Chairman and Directors, who have so generously given an outing of this description for a number of years; and the party left the Palace shortly before nine o'clock, arriving at Dover about 11.30.

MISCELLANEOUS NEWS.

THE INSPECTION OF GAS-LIQUOR WORKS UNDER THE ALKALI ACT.

The Sub-Inspector's Reports.

In recent issues of the JOURNAL, we have noticed the report of the Chief Inspector under the Alkali, &c., Works Regulation Act, 1881 (Mr. A. E. Fletcher), for the past year. We now give a few extracts bearing specially upon gas-liquor works, from the reports made to him by the Sub-Inspectors of the various districts into which the entire area under his supervision is divided. These are: (1) Ireland, Mr. W. S. Curphey, F.I.C., F.C.S.; (2) North of England, Mr. B. E. Smith, F.I.C., F.C.S.; (3) Cheshire, North Wales, and part of Lancashire, Mr. E. G. Ballard, with whom is associated Mr. J. Affleck, M.A., D. Sc., as an additional Inspector for the Widnes sub-district, comprising Widnes and Runcorn; (4) East Lancashire and Yorkshire, Mr. R. Forbes Carpenter, F.I.C.; (5) South Midland, Mr. E. Jackson, F.I.C., F.C.S.; (6) South-West of England and South Wales, Mr. A. C. Fryer, Ph. D., M.A.; (7) South of England, Mr. Brereton Tod, assisted by Mr. F. N. Sutton, F.I.C., F.C.S. Scotland—divided between Dr. Blatherwick and Mr. W. S. Curphey—is, as usual, the subject of a separate report.

In Ireland there are 28 sulphate of ammonia works, in which 2518 tons of sulphate were made last year. These figures are substantially the same as those for 1889. The general condition of the works has not undergone any alteration; the noxious gases being destroyed by fire in some of the smaller works. In many of these, the manufacture of sulphate of ammonia is of very limited extent. Two of the largest works produce four-fifths of the local output of the country; and the remaining 19 do not produce, on an average, 30 tons, while some of them produce less than 5 tons per annum. In all the larger, and many of the small works, oxide of iron purifiers are in use; and their condition received careful attention during the past year.

In the North of England there has been an addition of one sulphate of ammonia works; the number being now 34. The output of sulphate from these last year exceeded 4000 tons. At 32 of the works the source of the ammonia was the ammoniacal liquor of gas-works; while the remaining two works, with an output of 430 tons, obtained it in the process of manufacturing coke by the Simon-Carvès process. There were 26 more of these patent ovens added to one of the coke works last year. No complaint of nuisance arose from this class of work during the twelve months.

In the district under the supervision of Mr. Ballard—embracing Cheshire, North Wales, and part of Lancashire—there are 2 gas-liquor works, and 24 in which sulphate of ammonia is produced. This is a reduction of 7 works as compared with 1889. The works are all reported to be in good order. At one of them the continuous has been substituted for the intermittent system of distillation. Many of the smaller works still burn the sulphuretted hydrogen; but at the larger works this noxious gas is conducted to oxide purifiers, where it is absorbed. At another the sulphur is recovered as such in a Claus kiln; 8 or 10 tons having been produced during the year. At another works the saturator has been fitted with an automatic arrangement for sulphate crystals as soon as a sufficient quantity has been formed. "Fishing" with a perforated ladle is thus done away with; the crystals being delivered on to a drainer above the level of the saturator. The apparatus is stated to work well. The total quantity of sulphate made in the district (excluding the Widnes and Runcorn sub-district) last year was 2878 tons. In the last-named area, over which Mr. Affleck presides, there are five works furnished with plant for dealing with gas liquor and for the manufacture of sulphate and muriate of ammonia. Some of these were, however, out of use during the year; but about 900 tons of the two salts (chiefly sulphate) were made. There were no grounds for complaint as to the working of the plant in connection with these operations. Mr. Affleck cannot report in similar terms in regard to others; the Chance-Claus process coming in for some amount of condemnation for sending into the air large quantities of sulphurous acids. This matter is dealt with by him at considerable length in the section of his report devoted to the recovery of sulphur from alkali waste.

Mr. R. Forbes Carpenter, the Inspector for East Lancashire and Yorkshire, reports with regard to his district that though two fresh works appear on the register this year, the number of works dealing with gas liquor, or making sulphate and muriate of ammonia, shows a net reduction of one. The total quantity of ammonia manufactured into sulphate, muriate, and liquor ammonia (crude and refined) was equivalent to 22,850 tons of sulphate. The absolute quantity of sulphate made shows a reduction, compared with that made in 1889; the decrease being mostly due to demand for crude liquor ammonia (of 15 to 20 per cent. NH_3) for use in ammonia-soda manufacture. In this process of concentration, very little sulphuretted hydrogen is evolved in the free state, if the process is carefully conducted. In the remaining works, as regards the methods of treating the foul gases evolved, in 28 per cent. of the total sulphate made they are dealt with by combustion—forming part of the supply of sulphurous acid to vitriol chambers; in 19 per cent., the Claus process of limited combustion is used for the recovery of sulphur; in the remaining 53 per cent., the foul gases pass through oxide of iron purifiers. The proportion of gas liquor distilled by the intermittent and continuous processes remains nearly as before; the figures being 10·5 per cent. and 89·5 per cent., against 11 and 89 per cent. respectively for 1889. Mr. Carpenter's report contains the following interesting paragraph: "Further experiments on revivifying the oxide *in situ* have not proved this method to be one that can be recommended for general adoption. At the same time, where the purifiers are of any depth, it is most desirable to be able to blow air through them before they are emptied (*e.g.*, with a Körting jet), as instances have occurred of men engaged in throwing out the oxide having become unconscious, and of suffering from inflamed eyes, from exposure to the foul gases mechanically entangled in the oxide, and evolved when this is disturbed. At one works the men employed at the saturator suffered so severely from inflamed eyes as to be rendered blind for several days. The cause was somewhat obscure, as the saturator itself was perfectly sound and in good repair. As far as I could ascertain on investigation, the symptoms of inflammation were undoubtedly due to the action on the eyes of sulphuretted hydrogen and steam. Those familiar with the working of Mond's sulphur recovery process will also know that similar cases have occurred to the workmen in charge of decomposing the liquors where the same conditions are liable to obtain. It would appear that when the saturator, from the open side of which the salt is fished, is working under much back pressure (4 to 5 inches of water), and at the same time the acid used is not free from nitrous compounds, the sulphuretted hydrogen will disengage itself, as will also nitrous gases when present in quantity, from the open surface of the liquor. Neither cause seems sufficient in itself, unless aided by the other, to produce this reaction. It seems probable that in the future the form of saturator will be so much altered, if the adoption of the Wilton salt ejector becomes general in the larger works, that the area of the saturator open to the air will be so much reduced as to entirely do away with the possibility of such evils as I have described above. Cases have again occurred during the year, in works where oxide is used to purify the foul gases, of failure to revivify, and of oxidation to ferrous or ferric sulphates. The drier the oxide is used, the less liable this is to occur. A little of the oxide is damped to form a layer on the grids; and the rest should be put in as dry and dusty as possible. In very cold weather, it would appear, from recent experience, that oxide is very sluggish in the absorption of sulphuretted hydrogen. The gases, therefore, may be cooled to too low a temperature."

The South Midland District, over which Mr. E. Jackson has the supervision, contains 62 works in which the manufacture of either sulphate or muriate of ammonia and the concentration of gas liquor are carried on. This is an increase of two works as compared with 1889. Mr. Jackson says that, in the majority of the works, as stated in his previous report, including the smaller ones, the open oxide of iron purifier is employed for arresting the noxious gases. For the smaller works this may be said to be the best and simplest method; but with a make of sulphate of ammonia reaching from 15 to 20 tons, or perhaps even less per week, he says either burning and passing into the oil of vitriol chambers for the production of vitriol, or the treatment of the sulphuretted hydrogen by the Claus process is to be preferred. This is, of course, where a continuous method of distilling the gas liquor is employed; but with the intermittent plan, the only practical and efficient way of dealing with the offensive gas in this district is by the open purifier. Where oxide purification is used with a large make of sulphate, in order to ensure complete absorption of the sulphuretted hydrogen, constant watchfulness is necessary, and frequent changing of purifiers is required, unless a very large space is employed, and the cost of re-charging may come to be a serious tax on the process. At one works, where the intermittent process is employed, and therefore oxide purification is the only practical plan available, the oxide area was much increased last year. The purifiers are now 22 feet square, and contain 60 tons of oxide. For the smaller works, however, and perhaps in some instances making up to 7 or even 10 tons of sulphate per week, the renewal of the oxide is not an important matter from the point of labour. Five works in the district burn the sulphuretted hydrogen for the production of vitriol; four have adopted the Claus process, with final limestone scrubber and open oxide purifier. The sulphur gases escaping from the chambers have been found exceedingly variable; but in each case the purifying arrangements have been ample, and have prevented the final escape of the noxious gases. Two works pass the sulphuretted hydrogen into the hydraulic main; and in one small works an open lime purifier is employed. Four works last year added coke scrubbers to the condensing plant, for finally drying the gases before entering the purifying apparatus. There are now ten works where this form of condenser is used in the district. At one works considerable improvements have been made. The condensing apparatus has been much increased by the addition of 180 feet of iron pipes, and a water cooled final coke scrubber, 15 feet high by 3 feet in diameter; and the Claus plant, with final purifying apparatus, has been erected. The most notable improvement in this class of works during the past year was effected at works where in the previous year the sulphuretted hydrogen was burnt under boiler fires, after failure at oxide purification, due to insufficient purifying area and badly-arranged plant. An entirely new sulphate plant has now been erected, consisting of two continuous stills with superheaters, saturators, very ample water-cooled condensers, with two coke scrubbers; the sulphuretted hydrogen passing into the oxide burners, where it is burnt, and passes on to the vitriol chambers. The amount of sulphur gases formerly sent into the air from these works each year, taking the gas liquor as containing 0·60 per cent. of available sulphur, was equivalent to 250 tons of oil of vitriol. This is now all saved. An interesting feature in this modern plant is the careful utilization of waste heat from the stills; the spent liquor being made to heat up the water feeding the steam-boilers.

Coming now to the South-West of England and South Wales, we find Dr. A. C. Fryer reporting that the 59 registered works in his district where the manufacture of sulphate and muriate of ammonia is carried on, produced 6800 tons of salt last year. He says the average of the oxide of iron purifiers in this district show that 82 cubic feet of oxide of iron, occupying 54 square feet of area, are employed per ton of sulphate made per week. Several works use two purifiers when the process is continuous; one being kept ready filled with fresh oxide, and used as soon as the first shows signs of becoming foul. During the past twelve months one sulphate of ammonia plant was rebuilt; five works put up new staturators; four enlarged their oxide of iron purifiers; four added coke scrubbers or water condensers to their plants; and three now absorb the sulphuretted hydrogen in oxide of iron, when previously it was burnt in the boiler fire. Dr. Fryer mentions approvingly a very ingenious form of acid catch-box which Mr. C. Stafford Ellery has put up at the Bath Gas-Works.

The southern part of the South of England district is under the supervision of Mr. Brereton Todd. In this area there are 37 registered sulphate of ammonia plants; 31 of which are in gas-works, five belong to owners of chemical works who buy the gas liquor, and the proprietor of the other depends on the bone liquor obtained from the process of making animal charcoal. The quantity of sulphate made at gas-works

was 2983 tons; at other works, 1916 tons—total, 4899 tons. All the works are reported to be in an efficient state. Mr. Todd only found one escape, which could not be accounted for at the time. Subsequently, however, a crack about 18 inches long was discovered on the top of the large flat condensers; and this was promptly closed with a plate. Additions and improvements were made in three works. In one, a large oxide purifier was fixed; in another, a new saturator; and in the third, a large scrubber. The eastern counties division of this district (under the care of Mr. F. Napier Sutton) contains 38 works producing sulphate of ammonia, of which 32,308 tons were made during the year 1890. Reporting upon them, Mr. Sutton says: "There has been a further addition of a Claus sulphur-recovery plant for dealing with the sulphuretted hydrogen produced in the manufacture of sulphate. The works where this has been erected carbonize about 25,000 tons of coal annually; so that this is one of the smallest works which has yet adopted the Claus plant in connection with sulphate making. The plant has been working admirably, and has given very good results. The depositing chambers were opened after some three months' working, and the recovered sulphur obtained was about 1 ton for every 20 tons of sulphate manufactured. Since that time the chambers have not again been opened. The plant is provided as usual with a small limestone scrubber, and the tests made of the gases after passing this have always shown a very small amount of acidity. Any escaping sulphuretted hydrogen is finally absorbed in the oxide purifier. The Manager is very pleased with the recovery plant, and writes: 'It has worked satisfactorily all the time, and entirely does away with the sulphuretted hydrogen nuisance.' The other two Claus plants mentioned in former reports have been working throughout the year satisfactorily, and the escaping gases have been regularly tested. Two fresh works have started the manufacture of sulphate during the year. One is provided with a patent continuous still; while the second plant was on the old intermittent principle. This, however, the Manager has cleverly converted into a continuous still by an arrangement of bulkheads in the horizontal boiler. In one works the old intermittent plant has been replaced with the No. 4 size of Feldmann's plant; and the oxide purifiers have been greatly enlarged. The sulphate works in this district have, on the whole, given every satisfaction; and the plants have been maintained in good condition, and conducted without nuisance or complaint. In one or two cases I have had to call attention to defects; but in no instance of a serious nature. I know of no case where the cooling or purifying space is really deficient, though in some instances the latter may be smaller than is advisable. The number of works burning their foul gases has been further reduced to eight. Three of these do it in specially-constructed kilns, which ensure the most perfect combustion. The chimneys connected therewith are constantly tested, and no trace of sulphuretted hydrogen has been found. In the other five cases the gases are burnt in the boiler fires; and tests taken of the chimney gases show the combustion to be effectual. The average total acidity of the chimney gases in the above works last year was 2·1 grains (as SO_3) per cubic foot." Mr. Sutton gives particulars of the alterations and improvements carried out in 13 works; but, as usual, these are only indicated by numbers.

The concluding portion of the report relates to Scotland, which, as already mentioned, is watched over by Dr. Blatherwick and Mr. Curphey. The former states that 39,689 tons of sulphate of ammonia were manufactured during 1890, as compared with 39,505 tons in 1889. The former total is made up thus: Gas-works, 10,395 tons; shale-works, 24,730 tons; iron-works, 4564 tons. The figures show an increased production of about 500 tons from the gas-liquor works, and an increase from the shale-works of 777 tons; while there is a decrease from the iron-works of upwards of 1000 tons, owing to a long-continued strike amongst the workmen. The means of dealing with the escaping sulphuretted hydrogen remain the same. The use of oxide of iron purifiers has been discarded in the shale-works, in consequence of the difficulty experienced in eliminating the intractable tarry impurities which are held suspended in the large volumes of steam. In all cases now the steam and the sulphuretted hydrogen are conducted back to the retorts, and there burned. In the gas-liquor works, oxide purifiers are in general use. One new works was started last year, and is working satisfactorily. Mr. Curphey adds, on the same subject, that the recovery of ammonia from the waste gases of iron blast-furnaces was carried on to an increased extent during the greater part of the year; but that the annual production of sulphate from this source shows a diminution as compared with 1889, owing to the extensive strike in the Scottish iron-smelting trade. The strike caused an entire cessation of operations, in all those iron-works where the recovery of ammonia was prosecuted, during the three closing months of the year. The annual production of sulphate in these works is therefore that obtained during nine months' actual working.

Neath Corporation Gas-Works.—Mr. R. A. Browning, the Engineer and Manager of the Neath Corporation Gas-Works, has presented to the Gas Committee his financial statement for the year ending March 31 last. The gross profits, after meeting all working expenses, bad debts and allowances, amount to £1994; being a decrease of £270 upon the corresponding period of last year, and only £13 against the year 1889. This, he says, is due, in the first place, to the increased price of coal. In comparison with last year, this would represent about £460 more, and against the year 1889 about £920; so that with extra wages, &c., it has been a difficult matter not to increase the price of gas, or to interfere with the usual demands. On the other hand, a satisfactory increase in the gas-rental is shown, of £503; and there has also been an increase in residual products. Coke shows an increase of about £150; but there has been a falling off in the manufacture of sulphate of ammonia, due to the renewals of the apparatus being more than usual, and a higher price having to be paid for sulphuric acid. The other items, such as profit on fittings, rent of stoves, &c., also exhibit an increase. The balance of gross profit has been appropriated as follows, after paying £1296 interest on mortgages, &c.: £100 has been carried to the depreciation fund account, which now stands at £278; repayment account receives £500; and a balance of £695 remains to be carried to the next account.

THE STOCKTON CORPORATION AND THEIR GAS STOKERS.

At the Monthly Meeting of the Stockton Town Council last Tuesday—the Ex-Mayor (Mr. Alderman Nelson) presiding—there was a protracted discussion on the hours of labour at the gas-works and the dismissal of certain of the men—the latter, it will be remembered, being a matter over which there has recently been a good deal of agitation in the town. The Gas Committee's minutes contained a statement as to the working hours of the stokers employed at the works. The summary was as follows: "Time at work, 4 hours and 45 minutes (extreme maximum); time allowed for meals, 2 hours; time for rest and recreation, 4 hours and 5 minutes—total, 10 hours and 50 minutes."

Mr. Samuel asked why such an unusual report should be put on the minutes. Was it at the request of the Gas Committee such a return had been compiled, or had the gas stokers made any application with regard to their hours?

Alderman Bainbridge expressed the opinion that if men were working less hours in gas-works in other towns, the Stockton men should work as few.

Alderman Richardson said he had documentary evidence that the men were thoroughly satisfied as to their position. No question had been raised as to the hours of labour, which he thought were much more reasonable than those at many works.

Alderman Walton asked if there had not been a petition or memorial sent from the stokers to the Gas Committee.

Mr. Samuel said he hoped the petition would not be laid on the table. He did not care about a petition from the men when the foreman went about the works asking them to sign it.

The Ex-Mayor said they had nothing to do with the question as to what hours the men worked in other towns. The men were satisfied with their Manager (Mr. Ford); and it seemed to him a question of veracity. He believed in their Manager, who had been with them about a quarter of a century, and was one of the most valuable of the servants the town had. Indeed, during the time he had been with them, the town had made about £100,000 by the gas-works. It seemed to him a question whether Mr. Ford had to manage the affairs at the gas-works or the Trades Council.

A letter was then read from Mr. Jewitt, the Secretary of the Trades and Labour Council, enclosing the following resolution, which was passed at the recent public meeting in the Exchange Hall: "That this meeting is of opinion that the action of the Gas Committee of the Stockton Town Council in refusing to meet a deputation of the Trade and Labour Council, *re* the dismissal of workmen from the Corporation gas-works, is detrimental to the interests of good and sound local government; and, further, we are of opinion that a Sub-Committee from the Town Council should be appointed to confer with a Sub-Committee from the Trade and Labour Council to investigate the alleged charge."

Mr. Samuel moved—"That the Gas Committee be requested to appoint a Sub-Committee to meet a Committee from the Trades Council, and that such Joint Committee be appointed to investigate the alleged discharge of workmen employed in the gas-works in consequence of the men being members of the Gas Workers' Union." This matter, he observed, had created a great deal of feeling in the town; and he thought, in the interests of the Gas Committee, of the Gas Manager and of the Corporation generally, it should be finally settled one way or the other. The only way to settle it, in his opinion, was for the Town Council to treat the request of the Trades Council and the public meeting in a proper spirit, and in the way his motion suggested. Reference had been made to Mr. Ford's position in the town as a Gas Manager. He did not think there was any member of the Corporation who wished to question Mr. Ford's ability; but there might be questions arise, even with the best of men, as to the policy they were carrying out. It was not a question as to the hours of labour of the men—that was a matter extraneous to the present discussion. Since the question had arisen, the Gas Committee had made a grievous blunder; and Mr. Ford had made a blunder in not receiving the deputation appointed by the Trades Council, and in requesting instead the Secretary of the Trades Council to meet him alone. He believed had the deputation been received, the matter would have been settled before the dispute had arrived at its present state. In the second place, he thought it regrettable that the Gas Committee refused to receive a deputation, and so endorsed what Mr. Ford had done in not acceding to the Trades Council's request. This request was made, after a full investigation by them of the statements made by the men dismissed; and after sifting the evidence, they had come to the conclusion that these men had been discharged in consequence of their being members of the Gas Workers' Union. He urged the Gas Committee not to stand upon their dignity, but to accede to the request of the Trades Council in the matter. He had investigated the matter personally, and had had the statements of three of the men in writing before him; and, in his opinion, the evidence was conclusive that they had been discharged because they were members of the Union.

Mr. Redford seconded the motion.

Alderman Richardson said for one reason he was glad that he was Chairman of the Gas Committee, because his experience with respect to Unions and working men was generally recognized to be very extensive. But the fact was that certain men had neglected their duties at the gas-works. He examined the time-books; and if every member of the Council had seen them, they would have endorsed the action of the Manager. He (Alderman Richardson) had stated, on the authority of Mr. Ford, in the Council Chamber that the men were not discharged because they were Trades Unionists; and he pledged his word that no man should be discharged because he belonged to a Union.

Other members having spoken,

Mr. Ford explained that, in sending for the Secretary of the Trades Council, he had not the slightest intention to insult that body; it was rather as a mark of respect to them, and that he might inform the Secretary as to the case.

Mr. Samuel, in reply, read the statements of three men who had been discharged from the gas-works. One, named Cooke, had been employed fourteen winters in succession, and another named Ovedene;

and each of these, it was declared, had been told their services would not be required because they were Unionists. A third one also informed him that Mr. Ford had stated that the only thing he had against him was that he was a Unionist.

Mr. FORD declared this statement to be false.

Mr. SAMUEL said he would accept Mr. Ford's declaration; but there were the other two men, and he strongly urged that an investigation should take place such as he had suggested, in order to conclusively settle the matter.

Alderman RICHARDSON said that after his statement that he was perfectly satisfied the men were not discharged because they belonged to the Union, if the motion was passed he should take it as a reflection upon his word. ("No, no.") They might say "No, no;" but he would take it so, and if the vote was passed he would say good-bye to the Town Council of Stockton, of which he had been a member for so long a period.

The motion was then put, and lost by 21 votes to 5.

DUKINFIELD LOCAL BOARD GAS SUPPLY.

The Adoption of the Brin Oxygen System.

At the Meeting of the Dukinfield Local Board on Monday last week—Mr. G. Taylor in the chair—a somewhat heated discussion took place on the presentation of the minutes of the Gas Committee, which contained a resolution to accept an offer made by the Brin Oxygen Company to take a lump sum of £360 in lieu of the annual royalty of £60 for the use of their process at the gas-works; and to pay the amount six months after the Gas Engineer (Mr. Harrison Veevers) had certified that the process was satisfactory. The confirmation of the minutes having been moved and seconded, Mr. Manwood said before they were put he should like to make a few remarks. He took it that this would be the last opportunity they, as members of the Board, would have of expressing their opinion in respect to the process they were adopting; and, as a member of the Gas Committee. he wished to say that he was more convinced than ever that the Board were making a huge mistake by rushing blindly into the contract. The Chairman called Mr. Manwood to order. He said this matter had been gone through before in Committee as well as by the Board; and it was now all over. Mr. Manwood remarked that a contract had been signed, and the Board were asked to pass it. On this he should like to make a statement. The Chairman said the question before them was as to the royalty; and he contended that Mr. Manwood was out of order. Mr. Grime said he thought the Chairman had stated that the contract to pay the Brin Company upwards of £360 for royalty in a lump sum, six months after the establishment of the system, was signed and entered into, although it had not passed the Board. The Committee had evidently taken the matter upon themselves, and entirely out of the hands of the Board, who had now no control over it. If he was rightly informed, there were some important additions to the contract besides the £360. These were that the Board were never at any future time to have advantage of the improvements that accrued to the system as the result of the researches of scientists—that they were prohibited, he was told, from taking, at any subsequent date, advantage of scientific research making the system valuable. [Mr. Kerfoot: Yes; that is so.] Very well, if that was so, he should certainly protest against it; for a more preposterous thing could hardly be entered into. They knew how in times past great inventions had been brought out with respect to the production of gas; and scientific research was consequently becoming more valuable. If the Board sanctioned this contract, the Brin people would prevent them having the benefit of anything that resulted from this kind of work. He had been studying the oxygen system, and the weight of evidence at the present time, he was bound to say, was evidently in its favour. But if advantage did accrue from it, it would be no credit to the Board. They had gone into the matter rashly; and it would be more by luck than anything else that it turned out fortunately for them. The Chairman remarked that it was no use pursuing the matter any further. Besides, it was out of order; and it was useless to go over the ground again. Mr. Grime said, as a matter of fact, at the meeting of the Finance and Gas Committees, the things were strictly gone into, and several members expressed themselves strongly about having to pay the royalty at all. The Chairman said there was nothing about this in the minutes. Mr. Manwood contended that the Chairman was wrong, and out of order. He was proceeding to make some remarks reflecting on Mr. Taylor, when he was met with cries of "Order" and "Chair." The Chairman thereupon put the motion, and it was adopted. Mr. Grime remained standing while this was going on; and when the proposition had been put, he gave expression to some strong language condemnatory of the whole proceedings, and of the Chairman as the conductor of them.

Reduction in the Price of Gas at Northampton.—The Northampton Gas Company have reduced the price of gas, from Midsummer, to 2s. 4d. per 1000 cubic feet, with a discount of 7½ per cent. for prompt payment; thus making the net price 2s. 2d.

Poisoning by Gas at Trowbridge.—An inquest was held at Trowbridge last Saturday on the bodies of three persons, who had been poisoned while asleep by inhaling gas which had escaped from a street main. The jury returned a verdict of "Accidental Death," and expressed regret that the Gas Company's officials, on receiving notice of the leakage, had not immediately taken steps to ascertain its extent. The Company were recommended to use sectional stop-valves, and to lay their pipes at a greater depth.

Danger of Fire Through the Electric Light.—On this point the Zwickau (Germany) Board of Industry writes as follows in its annual report: "With regard to the supposed freedom from danger of fire where the electric light is used, we have to put on record that a paper-works was burnt down through minute pieces of the carbon pencils of an arc lamp scaling off and falling on and igniting some dry paper; while in a vicuna spinning mill, two distinct conflagrations were caused by the incandescent filament parts of damaged glow lamps dropping on to the dried cotton."

THE PURCHASE OF THE RHYL GAS-WORKS BY THE IMPROVEMENT COMMISSIONERS.

The Agreement Confirmed.

At the Meeting of the Rhyl Improvement Commissioners yesterday week—the CHAIRMAN (Mr. W. Williams) presiding— the Clerk read the minutes of the General Purposes Committee relative to the business of the deputation sent to London, and which had agreed to purchase the gas-works for £32,000, and to pay £1400 towards defraying the cost of the Company's Bill.

Mr. MOSTYN WILLIAMS, in moving the confirmation of the minutes, said that his idea at first was that £25,000 was a fair price; but from what transpired subsequently, he considered the works to be worth about £33,000. They were assured by two Engineers in London that the works ought to be bought at twenty years' purchase. An unincorporated company was in all probability not entitled to more than 18 years' purchase; while an incorporated company would be entitled to 28 years' purchase. They thought they could meet the Company in a fair way by calling for 20 years' purchase; and if they would multiply £1600 by 20, as agreed upon as maintainable profits, they would find the amount they had arrived at was a very satisfactory one. With regard to the condition of the works at the present time, they were assured by Mr. Hepworth that the sum of £600 would put the works in fair order, and make them produce at least 50 per cent. more gas than they had done previously. The Committee asked, in addition, how much it would cost to renew some of the important parts of the works; and they were informed that £1000 would cover everything. Therefore with an outlay of £1600, they would have works equal to a production of 30 million cubic feet per annum. The Engineers stated that the plant was somewhat antiquated, and the cost of production was higher than it ought to be. If they put in new retorts, however, they might be able to reduce the price of gas by £300 or £400 a year, and thereby be able to make a much larger profit. Under these circumstances, the deputation thought they would be justified in going up to £30,000 for the works.

The motion having been seconded, the minutes were adopted.

A recommendation of the Committee that the seal of the Commissioners be affixed to the agreement with the Company was also adopted.

WORCESTER CORPORATION WATER-WORKS.

The Proposed Improvement in the Severn Supply.

At a recent Meeting of the Worcester City Council, a resolution was passed respecting the improvement of the supply of water from the Severn; and Messrs. T. and C. Hawksley were, in consequence, asked to report upon the cost of carrying out certain works. This they have now done; and the estimates are as follows: (1) For the construction of four filters, £7714. (2) For the construction of a subsiding tank to hold 6 million gallons, £15,441. (3) For the construction of a subsiding tank to contain 7½ million gallons, £19,291. (4) For the widening of the footpath near Barbourne Brook, and the construction of a road therefrom, £2270. (5) For the construction of a reservoir to hold about 2 million gallons at Rainbow Hill, £13,860. (6) For the construction of a high-level reservoir (including land, roads, and enclosure) and the necessary mains, £2724. (7) For the covering of the pure-water tank, £953. (8) For four new engines and boilers for the town, and two others for the tanks, the latter with buildings, £21,879. (9) For a pumping-main from the water-works to the high-level reservoir, £2536. (10) For an independent main from the high-level reservoir to the London Road, £2260. The prices of various pieces of land which would be required for the scheme if carried out are also given. In regard to a question asked by the Committee respecting any modifications of the scheme which might occur to them, Messrs. Hawksley state that they wish to be excused from taking any voluntary part in the discussion of possibly controversial topics. To assist the Committee, however, they remark that, in their private opinion, the scheme is too vast and too expensive for the needs of a city of the size of Worcester; and they think that the objects in view may be sufficiently attained by simpler and more economical means. They believe the clarification of the water of the River Severn (which is essentially a chemically good water) may be satisfactorily attained by slower filtration. The addition of the proposed four filter-beds, or possibly of three beds, will, in their opinion, suffice without the aid of the very expensive depositing reservoirs suggested by the resolution of the Council. They do not think it necessary to replace the present engines. The existing ones will, if properly cared for, suffice for many years to come. As to the supply of the high-level area, this can be easily effected by placing a small engine at the present Rainbow Hill reservoir—either a gas-engine or an eight-hour self-acting motor, the boiler of which may be fed twice daily by a resident turncock. This arrangement will save an additional main pipe from the water-works, and considerable alterations of the machinery. Messrs. Hawksley also state that they are not advocates of the two big boilers system. Three smaller boilers, in their opinion, are undoubtedly more advantageous—two on and one off. There is no difference in the economy of fuel; whilst the large boilers, each of which must be equal to two of the smaller ones, are the more expensive in capital and repairs. As a mere matter of engineering, either description of boilers will answer the purpose, if equally well attended to. The report is at present under the consideration of the Water and Sewerage Committee.

The Cape Town and District Gaslight and Coke Company, Limited, have received from Cape Town advice to the effect that the consumption of gas for May last was 4,086,000 cubic feet, as compared with 3,267,000 cubic feet in May, 1890; showing an increase of 819,000 cubic feet. The officials of the Company state that they are unable to meet the demand for gas; and the erection of additional plant is progressing.

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday*.

The Aberdeen Town Council on Monday thrashed out the questions which have been thrust upon it by Socialist influence, supported, I am sorry to say, by some members of the Council, relative to the management of the Corporation gas-works. Bailie M'Kenzie, the Convener of the Gas Committee, in moving the adoption of the Committee's finding—that "no foundation exists for the allegations referred to in the resolutions" which were adopted at an open-air meeting called together by Socialists—said that last time the subject was before the Council he characterized the resolutions as a tissue of falsehoods; and he was glad that moving the adoption of the report that day gave him the opportunity of proving what he then alleged. Proceeding to reply to the charges which were made in the resolutions, he said the first complaint was that sixteen men of long service were dismissed for the reason that they had grown old. That was not true; for at the time mentioned there were nineteen men dismissed, and only three of these nineteen had been in service at the gas-works for more than eight months. The memorial in the second place referred to the practice of overtime. It was very seldom that overtime was worked at all; and it was only necessitated by the regular men not coming to their work at the proper time, which happened more often at the New Year than at other times. As to the next charge—that it was proposed to increase the price of gas—the price for next year had not been fixed, and could not be until the annual balance was completed and an estimate made of the revenue and expenditure for the ensuing year; so that they could not say whether the price would be dearer or cheaper—very likely it might be dearer. As to the quality of the gas being worse next year than last year, they would remember that only two months ago they arranged contracts for coal that would produce fully the illuminating power that last year's produced; so that he was quite justified in saying that these three charges were not true. It was also charged, in addition, that four large hemp ropes and one manilla rope, costing £170, had been used upon the stoking machinery in a very short time, which was not true. Two of the hemp ropes were lying untouched, and the manilla rope had only been put on for one or two turns; and the other two ropes had been used unfairly, by the employees at the gas-works having maliciously run two of the machines together, causing a great amount of damage. Bailie M'Kenzie proceeded to say that the whole of the charges seemed to centre in the dismissal of two men named Johnston and Stephen from the gas-works. Johnston was the man who admittedly gave the information to the Socialists; and Stephen continually interfered with the foremen and with his fellow-workmen, and he had only been kept on in consequence of his possessing the faculty of being able to work with both right and left hands. He was dismissed as soon as they could afford to do without him, which was when the stoking machinery was started. After complaining that the information must have been given by "some one not far from their table" as to the wages paid in the gas-works, Bailie M'Kenzie went on to say that the average wages paid in 1891 were much higher than in 1890; because in 1890 they had a number of old men who received from 8s. to 10s. per week, and who, of course, raised the number of workmen but brought down the average wages. But the true way to look at the matter was that in 1890 they carbonized in a week 476 tons of coal at a cost of 3s. 9¾d. fully; while in 1891, with a much smaller number of men and a higher average wage, they carbonized 647 tons in one week at a cost of 2s. 11¼d. per ton, which showed a saving of over 10½d. per ton. A counter motion was moved to the effect that the subject should be sent back to the Committee for inquiry, on the allegation that the Convener only and not the Gas Committee, had investigated the charges. In the discussion which followed, Lord Provost Stewart pointed out that if the counter motion were carried, it meant that the Gas Manager would be dismissed. This was demurred to by the supporters of the counter motion; and eventually the Council, by 14 votes to 5, adopted the finding of the Gas Committee. Thereafter there came the following notices of motion: "That it be remitted to the Gas Committee to procure a report from a competent engineer as to the actual saving effected by the new stoking machinery and the coal breaker since their introduction into the gas-works;" and "That a Special Committee be appointed to inquire into the statements made by Bailie M'Kenzie to the effect that a member or some official of the Town Council had given information to the press anent the matter before the Gas Committee; to consider generally the question of supplying Committee information to the newspapers; and to report." It is satisfactory to find the Council supporting the management of Mr. Smith in the gas-works. I presume the opposition to the management comes from councillors who are either small employers, or not employers of labour at all; and who consequently either do not understand labour questions, or do not sympathize with employers of labour.

The revenue of the Arbroath Gas Corporation for the year ending May 31 amounted to £10,042 4s. 5d., of which £8805 2s. 8d. was derived from the sale of gas, an increase of £1015 19s. 4d. upon the sum realized in the previous year. The increase is mainly owing to the price of gas having been raised 3½d. per 1000 cubic feet. There is a surplus revenue of £3 2s. 5d. The estimated revenue was £9502 18s. 3d., of which £8333 6s. 8d. was expected from the sale of gas; so that on the revenue side the business of the Corporation shows very satisfactorily indeed. That is particularly apparent when it is recollected that the revenue for the year 1889-90 was only £7789. On the expenditure side there must, however, also have been a very large increase.

Every week just now there are reports published of the annual meetings of the smaller gas companies, of which there are so many in Scotland. The meeting of the Brechin Gaslight Company was held on Monday. It was reported at it that there was a decrease in the profits for the past year, owing to the increase in the cost of coal, as well as of taxes and other expenses. The make of gas last year was over 21 million cubic feet. The dividend paid was at the same rate as last year—viz., 35s. per £10 share. The price of gas remains at the rate of 4s. 4½d. per 1000 cubic feet. The shareholders of the Alyth Gas Company also met on Monday, and declared a dividend at the rate of 5 per cent. for the past year. Owing, it was said, to there having been considerable leakage, it was resolved to have a station meter placed in the works. At Crieff, the annual meeting was also held on Monday, when a dividend at the rate of 5 per cent., and a bonus equal to another 5 per cent., was declared. The shareholders agreed to the erection of a new set of retorts at a cost of about £800.

In marked contrast to the southern parts of the United Kingdom, Scotland was favoured last winter with an exceptionally mild season, one attendant of which was a very much diminished rainfall. The summer has also hitherto been what is termed a "dry" one, with the result that the rivers and streams have much earlier than usual begun to contract to their autumn dimensions. Among others, it was reported the other day, that "Tweed's fair river, broad and deep," had fallen so low that at one part in the Melrose district it could be crossed dryshod. Such a prolonged period of dryness is, of course, telling upon the water supply of populous places, some of which have already, at this early stage of the season, been placed on short allowance. It is announced that the Edinburgh consumption is at present in excess of what the gathering-grounds are furnishing; and that, in consequence, the reservoirs are being emptied. The Glencorse reservoir is 13 feet down from the ordinary datum, as compared with 5 feet down at this time last year. The streams which flow into this as well as the Loganlea reservoir are almost dry; and the only supply to them is practically from the Crawley Springs, which yield 70 cubic feet of water per minute. Fortunately the supply from the Moorfoot Hills does not show the same falling off, though, very curiously, the rainfall in that district has been proportionately very much less. In the Glencorse district, which is the southern slope of the Pentland Hills, the rainfall since the 1st of January has been 12·75 inches, as compared with 18 inches in the same period of 1890; while upon the Moorfoots the rainfall has only been 8·97 inches, as compared with 16·74 inches. The Gladhouse reservoir, however, on the Moorfoots, at present contains 1378½ million gallons, as compared with 1306½ million gallons at this date last year. During the past four weeks, it has been drawn upon to the amount of 6,787,000 gallons per day; and it has gone down at the rate of 6 million gallons daily—showing the inflow to it has been only 787,000 gallons each day. But there is, as yet, no need for alarm; because, taking all the sources of supply into account, there is sufficient to last two or three months, in which time there will doubtless be a considerable rainfall, of which we have already an instalment.

From our Glasgow Correspondent.

GLASGOW, *Saturday*.

The South of Scotland is again my starting point; and first in order I may refer to the Galashiels Gaslight Company, whose fifty-seventh annual meeting was held last Tuesday—Mr. James Aird presiding. It was stated in the Directors' report that the net income for the year had been £10,840, against a net expenditure of £7795, while the profit for the year amounted to £1880. At the beginning of the year there was a free balance of £5914; and after allowing a dividend of 10 per cent., a balance of £5695 would remain in hand to carry to next year's account. There had been manufactured during the year 57,252,800 cubic feet of gas, of which the amount that passed through the consumers' meters was 55,591,156 feet, being a decrease of 3,032,464 feet as compared with the sales in the preceding year. The illuminating power of the gas during the year has been maintained at the usual high standard of 29 candles. After narrating the particulars of a dispute between the Company and the Town Council regarding a charge made by the latter body for the use of the streets for laying the pipes, the report stated that the following arrangement had been arrived at—namely, that the Company should pay the sum of £35 per annum to the Corporation for the upkeep of all streets that may be disturbed by the Company, the latter body to make up at their own expense all roads broken up for laying, repairing, or examining their pipes, to the satisfaction of the Corporation; and that where long stretches of pipes are laid, the track to be kept up by the Company for a period of four months. The value of the Company's works and other property was put down in the balance-sheet at £26,624; depreciation during the past year having been allowed for at the rate of 2½ per cent. Owing to the increased price of coal, the Directors had found it necessary to raise the price of the gas 5d. per 1000 feet for the year 1890-91. It was objected by some of those present that the rate of 2½ per cent. for depreciation was too small; and after some discussion, it was agreed to have the works valued so as to test the point.

At Duns the shareholders of the Gas Company's held their annual meeting this week, and a dividend of 8 per cent. was declared. At Jedburgh the dividend declared was 7½ per cent.—the same as last year. The price of gas at Castle-Douglas, in the south-west, has been advanced to 6s. 8d. per 1000 feet; being an increase of 5d. At Dunoon (on the Firth of Clyde) a new gasholder has for some time been in course of erection. It is now nearly completed. At the adjoining township of Innellan, the price of gas has been raised from 5s. 6d. to 6s. 8d. per 1000 cubic feet.

A new retort-bench, working on the regenerative principle, as carried out by Mr. G. R. Hislop, of Paisley, has given excellent results at the Dumfries Corporation Gas-Works during the past year. One of the results arising out of the improvements is a very marked increase in the revenue derived from the sale of coke that has been saved.

At the last meeting of the Hamilton Town Council a brief discussion was initiated by Mr. Scott on the question of the future extension of the gas-works. He stated that the price of gas was so low—being lower in only one town in Scotland—that they were entitled to look before them and make fresh provision, even at the risk of raising the price. He was certain that something in the way of extending the works would have to be done before very long. Bailie Patrick asked, What about the electric light? Mr. Scott replied that it might come by-and-by; but it was not here yet. Treasurer Keith wished to know if there had been any complaint reported by the Manager as to want of gas; and Mr. Miller was of opinion that the Manager had reported that there would be a necessity for extension shortly.

The Glasgow Corporation Gas Committee's minutes came up for

consideration at last Thursday's meeting of the Town Council. One item was that the Committee was to be called henceforth the "Gas and Electric Lighting Committee;" and that a Sub-Committee should be constituted which should be known as the "Sub-Committee on Electric Lighting," to consist of eleven members, three to form a quorum. Councillor Bell was nominated as Convener of the new Sub-Committee, he being the only member who has had any actual experience with the electric light, which he uses in his own house, power being got from a gas-engine. The minutes also stated that the Sub-Committee had recommended that an electrical engineer should be appointed for the purpose of taking the practical management of, and advising the Corporation in regard to all matters connected with the Electric Lighting Department, and that it be remitted to the Sub-Committee to recommend a suitable person for the appointment. At another meeting, the Sub-Committee recommended that the salary to be offered to the electrical engineer should commence at £250 per annum. When these matters came before the Council, exception was taken to the amount of salary offered, the opinion being expressed that a suitable person could not be got at such a small salary. The minutes were agreed to, however, without a division.

The Glasgow pig iron warrant market has been very idle this week, and Scotch warrants have only fluctuated in price between 47s. 2½d. and 46s. 11½d. cash, closing yesterday afternoon at 47s. 1d. per ton cash. Hematite and Cleveland warrants have also fluctuated within small limits. The Glasgow Fair Holidays are at hand; and it is thought that there will not be much business done in warrants for the next couple of weeks or so.

Some of the Lanarkshire coal masters are hurrying up the miners to complete various pressing orders before the holidays actually set in. There is a good shipping demand for coal; and in some cases the prices asked are rather firm.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 11.

Sulphate of Ammonia.—The market remains *in statu quo*. £10 12s. 6d. is the lowest quotation here or Hull; and if the business has not been large, it is due to the small quantity on the market. Stocks have been well cleared generally; and although the prospects of a good demand are poor at present, an accession of numerous requirements would have the inevitable effect of a sharp reaction in prices. There are meanwhile many inquiries for forward contracts; but few makers are to be found willing to listen to these overtures. £11 would be obtainable for delivery from September forward. This is a favourable feature. Nitrate is easier, and can be bought at 8s. 6d. on spot. Still the future cannot by any means be viewed in an unfavourable light, as it is most unlikely that the shipments during the second half of the year can reach those of the same period last year, and there may eventually be a large deficit.

LONDON, *July* 11.

Tar Products.—There is a healthier tone in this market. Some of the drooping products are now more enquired for, and are likely to recover some of their former value. Carbolic acid, 50's benzol, and solvent naphtha are moving off more freely at slightly improved prices. Important pitch business is being done for next season; and the price is firm. Creosote and other tar oils, although still very weak, are in somewhat better demand; and makers are now hopeful of being able to dispose of their stocks before the advent of next season's produce. Very little is being done in anthracene; and the few lots of "B" quality that have changed hands, show no improvement in price. More reasonable rates are being paid for tar; and distillers appear to have awakened to the fact that at the higher prices recently paid (unless products resume last year's values), they would likely be serious losers. Prices: Tar, 23s. to 29s. Pitch, 33s. to 34s. Benzol, 90 per cent., 3s. 10d.; 50 per cent., 2s. 8½d. Toluol, 1s. 7d. Solvent naphtha, 1s. 5d. Crude naphtha, 1s. 1d. Creosote, 1¾d. Carbolic crystals, 6d.; crude, 60's, 1s. 4d. Cresol, 8d. Anthracene, "A" quality (nominal), 1s. 4d.; "B," 10½d. to 11d.

Sulphate of Ammonia.—It is generally thought that this market has now "touched bottom;" and though business continues flat both for prompt and forward delivery, makers are not without hope that, with the advance of the autumn, better prices will obtain. Stocks are larger than is usual at this time of the year. Makers cannot accept lower prices without entailing serious losses. Business, however, has been done at prices ranging between £10 12s. 6d. and £10 15s., less 3½ per cent. Gas liquor is selling at 4s. to 5s.

THE LANCASHIRE GAS COAL TRADE.

From Our Own Correspondent.

The gas coal season is now rapidly drawing to a close; and the settlement of the Salford Corporation contracts during the past week practically completes business of any weight remaining to be decided in the district surrounding Manchester. There are special features in connection with the Salford contracts which it will be interesting to notice as indicating what seems to be a very general impression among buyers. Although there is evidently a conviction that no great alteration can be made upon prices this year beyond the concessions to which I have already referred in previous reports, the belief exists that present prices cannot be permanently maintained, and consequently very little disposition has been shown to buy at all largely forward. Certainly, with evidences of declining activity in many of the principal coal-using industries, there appears more than a probability that next year the effects of altered conditions in trade may be strong enough to bring about a return of prices to something like late rates; but as this will have to be accompanied by a substantial reduction in wages, it is tolerably certain that it will not be accomplished without a keen struggle between the colliery-owners and the men. Users of gas coal, regulating their purchases upon the likelihood of prices being lower next year, have in many cases been confining their contracts to the ensuing twelve months' requirements, and, buying in lessened quantities, have consequently been in a large measure able to limit their acceptance of tenders to those where colliery-owners have been prepared to make some fairly substantial concession upon last year's rates; while those who have adhered more closely to last season's prices have, to a considerable extent, found themselves passed over. The Salford Corporation, who had previously contracts running over two and three years, have this season simply bought sufficient to carry them over the year; and the total quantity of coal they have contracted for has only slightly exceeded 23,000 tons, divided into two contracts—one with Messrs. A. Knowles and Sons, and the other with Messrs. Newton, Chambers, and Co. Both these firms placed contracts in 1889; Messrs. Knowles's contract, amounting to 40,000 tons, with deliveries extending over three years, and Messrs. Newton, Chambers, and Co.'s contracts to 54,000 tons extending over two years. This year the Salford Corporation have renewed the contract with Messrs. Newton, Chambers, and Co.—the previous one having now run out—for 12,700 tons, at 11s. 4d. per ton delivered at the Regent Road gas-works; whilst they have supplemented Messrs. Knowles's contract, by a further contract for 10,500 tons at 10s. 10d. per ton delivered in Salford. As a good deal has been said with regard to the extraordinary advance in prices which has taken place since 1889, it will be interesting to compare the prices accepted upon contracts placed during the past week with those in 1889. Two years ago Messrs. Newton, Chambers, and Co. contracted for the 54,000 tons at 10s. 3d. per ton delivered, and Messrs. Knowles and Sons for their 40,000 tons at 10s. per ton; so that in the first case, present prices exhibit an advance of 1s. 1d., and in the latter of only 10d. per ton upon the prices of 1889. Another contract recently settled was that with the Heywood Gas-Works, at 11s. 9d. per ton delivered, which was a concession of 6d. per ton upon the prices obtained from the same colliery firm on a similar contract last year. Other small contracts have been settled at prices ranging from 9s. 6d. to 10s. per ton for the best screened gas coals at the pit mouth. With regard to the general condition of the coal trade, there is a continued quietening shown in most descriptions of fuel, and generally stocks are beginning to accumulate, but it is only in very exceptional cases when anything like large quantities have so far been put down at the pit mouth; and the probability is that the summer will close with smaller stocks on hand than have been held for a considerable time past. As to prices, the better qualities of round coal are maintaining their position with remarkable firmness, and practically there has been no really material concession upon winter rates. At the pit mouth best Wigan Arley is still quoted at from 12s. to 12s. 6d. per ton; and although the top figure is little more than nominal, some of the colliery-owners prefer to put all they are raising down into stock rather than take lower prices. Pemberton four-feet and second qualities of Arley range from 10s. 6d. to 11s.; and common house-fire coals, 9s. to 9s. 6d. per ton. The lessening activity in the iron trade and other industries has necessarily tended to weaken the position of the commoner qualities of round coal suitable for steam and forge purposes, and here and there concessions of about 6d. per ton have been made. Whilst for shipment very low figures are being accepted in some instances, there is no material giving way of a general character. At the pit mouth steam and forge coals range according to quality from 7s. 9d. to 8s. 6d. per ton, while for shipment some inferior descriptions have been offered at as low as 8s. 6d. Common steam coal is readily obtainable at 9s. to 9s. 6d.; with the better qualities fetching 10s. to 10s. 3d. per ton delivered at the High Level, Liverpool, or at the Garston Docks. Engine classes of fuel are plentiful; and although better sorts move off fairly well, common descriptions continue a complete drug, and very irregular in price, large users in many cases preferring to meet current requirements with the cheap supplies now offering in the market rather than renew contracts. At the pit mouth the best qualities of burgy fetch 7s. to 7s. 3d., common sorts, 6s. 9d. to 7s.; the best qualities of slack, 6s. to 6s. 6d., with common sorts offering freely at 3s. 9d. to 4s. 3d. per ton.

Northern Coal Trade.—There has been an improvement in the gas coal trade during the last few days; and it is probable that the demand will now steadily and slowly increase for some time to come. Steam coals, on the other hand, are in slightly weaker demand. Best Northumbrian steam coals are from 12s. to 12s. 6d. per ton, free on board; and most of the best collieries are well employed. Second-class coals are in less demand; and the price is rather weak; and steam small coals are also quiet, owing to the very large production. For gas coals there have been many contracts concluded of late; and the available output must now be well taken up. One of these—that for Limerick—must be looked on as typical; the price leaving about 9s. per ton for the coal, free on board. A large amount of gas coal has also been sold for delivery over the next few months—the prices varying from 9s. 3d. to 9s. 9d. per ton, free on board; and some of the collieries seem to expect that for odd cargoes there will be an early advance in the price. Bunker coal is very abundant; and the price is, in consequence, weak, at from 8s. 6d. for unscreened, up to 12s. for best screened. Manufacturing coal is also very quiet, for similar reasons. In coke, there is not much alteration, the price for best blast-furnace coke for shipment being about 16s. free on board. Gas coke is not yet very plentiful, and the price is unchanged.

The Additional Water Supply for Mansfield.—The Mansfield Ratepayers and Owners' Association have recently forwarded to the Improvement Commissioners a memorial in which the following resolution (which was passed at a public meeting) is included: "That this meeting has heard with surprise that the Engineer's estimate for increasing the water supply of the town of Mansfield is £25,000, which provides for the construction of new water-works. When the late Water Company's works were purchased, the Directors expressed their opinion that £5000 would be sufficient for extensions; and the ratepayers in public meeting assembled were given to understand that £10,000 would be the fullest outlay. This meeting considers that any sum in excess of £10,000 will be extravagant, and is not calculated to meet the support of the ratepayers." The memorial was referred to the Water Committee, who will submit a report at the next meeting of the Commissioners on the proposals of the Engineer (Mr. Rolfe).

The Hybrid Committee on the Metropolitan Water Supply.—The Hybrid Committee appointed to consider the Bills promoted this session for dealing with the water supply of the Metropolis, whose proceedings are now being reported in the JOURNAL, met again last Wednesday for the consideration of their report; and, after some discussion upon the draft submitted by the Chairman (Sir M. W. Ridley), adjourned until to-day. It is believed, says *The Times*, that the proposals formulated by him have relation mainly to the necessity for further inquiry as a condition precedent to legislation. The London County Council are mentioned as the body to which the investigation might be entrusted; the inference being that, in the view of the Chairman, it is upon the Council that the duty of controlling the water supply should ultimately devolve. As to the question of acquiring fresh gathering-grounds, the Chairman is said to be in favour of the appointment of a Royal Commission to consider the whole subject.

The Public Lighting of Reigate.—There has been some dispute between the Redhill Gas Company and the Reigate Town Council as to the price for the gas supplied to public lamps in the district of the latter. The Company offered to supply gas by meter, and to light the lamps at 2s. in excess of the charge made by the Reigate Gas Company; but the Highways and Sanitary Committee of the Council asked them to accept £3 3s. per lamp. The Company declined to accede to this request; and consequently the Committee recommended the Council at their last meeting to invite tenders for lighting the streets by electricity. The adoption of the report having been moved and seconded, Alderman Whitehead observed that the Corporation were most extravagant in the matter of lighting in the borough; the gas bill amounting in the year to £1800. He said advisedly that they burned too much gas, because it was often used when not required. Mr. Ongley pointed out that there was no time to arrange for lighting by electricity before the termination of the Gas Company's contract; and the Mayor then moved, as an amendment, that "the offer of the Redhill Gas Company to supply gas by meter for 3s. 4d. per 1000 feet be accepted, and that the Corporation provide their own servants for the lighting, extinguishing, and painting." This having been seconded, Alderman Field remarked that the Company made very little out of the public lighting. They had had to pay more for their coals; and therefore they asked for an additional 2s. per lamp. A further amendment was moved by Mr. Burtenshaw to the effect that the terms of the Company be accepted. The Mayor withdrew his amendment; and on the new one being put to the Council, the voting was equal, and the Mayor gave his casting vote in its favour.

Tarapaca Water-Works Company, Limited.—The Directors of the Tarapaca Water-Works Company, Limited, report that the net profits for the year ending Dec. 31 last were £56,187, after writing off £1543 from preliminary expenses and office furniture. Adding to the £56,187 the balance remaining from the year 1889—viz., £5196—there was a total to the credit of the profit and loss account of £61,383. Of this sum, £19,400 was paid in dividends and allocated for income-tax previously to Dec. 31, 1890; leaving £41,983. From this latter amount a further sum of £20,000 was paid by way of dividend on April 4 last; and it is now proposed to carry forward the balance of £21,983. The dividend thus distributed amounted to 9½ per cent. on the capital of the Company. The Directors state that during the past year they entered into an arrangement, as from Jan. 1, 1891, with Colonel J. T. North for the purchase, for £50,000, of his steamboats, together with the water-tanks, pipes, properties at Arica and Pisagua, and the goodwill of the Pisagua water business; and the purchase-money is being paid out of the revenue at the rate of £2500 per month. The purchase has given the Company the command of the supply of water at the two great shipping ports of Tarapaca—Pisagua and Iquique; has placed them in a most independent position with regard to the supply of water; and has enabled them to make a contract for ten years with the Nitrate Railways, to provide them with either Pica or Arica water, at the Company's convenience, and at a fixed rate of exchange—a concession in price being made for a portion of the water supply. During the political disturbances, the pipes were cut on two or three occasions; but, fortunately, only trifling damage was done to the tanks, and little water was wasted. At the annual general meeting of the Company held on Monday last week, the report was adopted.

The Provision of Water-Fittings for Constant Supply.—At the Wandsworth Police Court last Wednesday, before Mr. Denman, Mr. Curnick of Halden Road, Westhill, Wandsworth, appeared to answer six summonses issued against him by the Southwark and Vauxhall Water Company for infringements of their regulations. Mr. Guiry appeared for the Company; Mr. Jones defended. The case had been before the Court on a previous occasion (see *ante*, p. 35), when, owing to a technical difficulty in the form of the proceedings, the summonses were withdrawn. The case now began *de novo*. Mr. D. Worger, Assistant Engineer to the Company, said that defendant's premises were situated within a district to which it was proposed to furnish a constant supply of water; and at the end of last October, notice was served upon him to adapt his fittings within two months. The notice had not been complied with. It was argued that defendent, as owner, was the responsible person; but Mr. Jones held that the consumer was liable. The regulations were made in pursuance of the Metropolis Water Act, 1871; and the Company admitted that they did not consider any offence committed until the necessity for a constant supply arose, because for such supply different fittings were required from those needed for an intermittent service. In deference to the wishes of the Medical Officers of Health throughout the Metropolis, the Company were providing a constant supply. Everybody was trying to compel them to give it; and they were endeavouring to do it without having it forced upon them. Mr. Denman remarked that it was a very good thing, but the question was, who was responsible for the fittings. Witness said several Magistrates had expressed an opinion that the owners were liable. Mr Jones said the notice served by the Company did not make something an offence which was not previously one. In the case of a house let on lease, he argued that the landlord had no right to interfere; but if anything was done, it must be by the tenant or by the company, who could charge the tenant with the cost. Mr Denman dismissed the first summons, and adjourned the other five until a case had been stated and adjudicated upon.

A Large Waste of Vyrnwy Water.—The Liverpool Corporation Water Committee last Tuesday had a lively discussion on the question of the amount of water now being received from the Vyrnwy works. Mr. Parry reported that the quantity of Vyrnwy water in No. 1 Prescot reservoir was 20 million gallons, which was equal to about one days' supply for Liverpool. The Oswestry filter-beds were not yet in full operation; and the quality of the water was not as satisfactory as it would be hereafter. Adding Vyrnwy to Rivington water, the total quantity now in reserve in Prescot was only 30 million gallons. The adoption of the report having been moved, Alderman T. Hughes remarked that, when the temporary pipe-line was laid down, they were told that they would get 4 million gallons a day by it, and possibly, under pressure, nearly 5 millions. It was very important that they should know exactly the quantity they were obtaining, because he was afraid that actual experience fell far below the expectations they had been led to form. Mr. Parry said that he had received 11 million gallons from the Prescot reservoir during the past week; and this was under 2 million gallons a day. Alderman Hughes inquired what quantity of water was sent daily from the Vyrnwy works. Mr. Parry replied from 5 to 6 million gallons. Alderman Hughes: "And we are getting less than 2 million gallons a day?" The obvious conclusion, he added, was that, in consequence of the defects in the pipe, the bulk of the water was going into the river instead of to Prescot. He hoped an explanation as to this matter would be forthcoming from Mr. Deacon. Several other members made remarks on the subject; and the proceedings of the Committee were subsequently confirmed.

Defrauding the South Staffordshire Water-Works Company.—At the Handsworth Police Court last Friday, Mr. J. Darrell, Manager of the London Screw Company, Smethwick, was charged with unlawfully causing to be affixed a pipe to a service-pipe belonging to the South Staffordshire Water-Works Company on June 29. Defendant did not attend the Court; and medical evidence was given to show that he was suffering from heart disease. Edward Harman was called, and said that he was at the present time in the employ of defendant as engine-driver and caretaker. He entered into the employ of the London Screw Company in January, 1889. About ten days after he had been at work at the place, Mr. Darrell took him into the yard and, raising a brick, showed witness a small iron plate underneath, upon raising which a half-inch pipe was disclosed. Defendant then said that he had to pay for the water in the works through the meter, but that this "little arrangement made the water a little cheaper." Defendant then explained that there was a cistern underneath the yard which supplied water to the works; and he then fetched out a hose pipe and attached it from the kitchen tap to the cistern, and witness immediately heard the water run from the tap in the house into the cistern. Witness generally ran the water from the kitchen tap into the cistern three times a week; the water was allowed to run from nine o'clock at night until five o'clock next morning. About eight months after he had been at the works defendant came to him, and showed him a water bill which had been sent in by the Water Company. Defendant complained that the bill was a large one; and that witness had been using the water through the meter. This took place after they had left off using the water through the hose for a month. He received notice to leave his situation last week. Dr. Rogers, for the Company, remarked that he had several other witnesses who could swear to the hose being used as stated by Harman, as far back as fourteen years ago. For the defence Mr. Sharpe said this was a case of tainted evidence. The witness Harman was under notice to leave the employ of the defendant, and had given information to the Water Company. Three witnesses were then called, who swore that they had never seen the hose in use, although they were intimately acquainted with the premises. Defendant was fined £5 and £2 11s. 6d. costs.

The Mid-Kent Water-Works.—We take from a recent number of the *Builder* the following particulars in regard to the above works: The works were constructed by a Company called the Mid-Kent Water Company, Limited, to supply water to about eleven parishes in Mid-Kent. They may be described as being situated in a triangle, with Maidstone, Sevenoaks, and Chatham at the angles, and the River Medway passing through it from south to north. The Company are protected by Acts of Parliament passed in 1888 and 1890; the latter being an extension of area which was applied for at the request of the Sanitary Authority, and added a population of about 50 per cent. to the original district. The population of both districts in 1881 was 13,750; and for 1891 it is estimated at not less than 16,500, being an increase of 20 per cent. in the decade. The late Mr. W. Russ, M. Inst. C.E., and Mr. A. F. Bowker, F.R.G.S., were the Company's Engineers; but since the death of the former, in February last, the latter has carried out the works to completion. The sinking of a well into the lower greensand was commenced in July, 1889, by Mr. R. D. Batchelor, of Chatham, and successfully completed the following February. The depth was 375 feet—140 feet chalk, and 210 feet stiff gault; the remainder being the upper greensand between the chalk and gault, and the upper crust of the lower greensand. The bore-hole is lined with screwed wrought-iron tubes, 15 inches in diameter right through. The pumps are 44 feet below the surface; the water rising when at rest to 25 feet from the surface, and when at work pumping 500 gallons per minute, about 60 feet from the surface. A Pulsometer steam-pump, capable of pumping 28,000 gallons per hour, is in the well, in order to pump the water out in the event of anything happening to the permanent pumps. The engines, which are compound, with air-pump and surface condenser, are in duplicate; as are also the boilers and pumps. The latter are of the plunger type, with ten barrels, and work off a disc on the main shaft of the engine. They can be worked with 18, 24, 30, or 34 inch stroke. The reservoir is situated at Upper Halling, at such an elevation that the works on the banks of the Medway can be supplied with water at a pressure of upwards of 90 lbs. per square inch. It holds nearly 200,000 gallons. When the works are more fully developed, it is contemplated to place a reservoir in the south of the district, 6¼ miles from the pumping-station; the present being about 1¼ miles in the opposite direction. Some 10 miles of mains have been laid; and, to complete the district, some 12 miles more will be put down. Already about 250 houses are being served, besides supplies in bulk.

Mr. G. Phillips, Foreman of the Malton (Yorks.) Gas-Works, has been appointed to fill a similar position at the Colne and Marsden Local Board Gas-Works.

Kirkleatham Water Supply.—The Local Government Board have granted leave to the Kirkleatham Local Board to borrow £4000 with which to purchase the water-pipes, &c., of the Stockton and Middlesbrough Water Board within their district, in order to enable them to transfer their custom to the Cleveland Water Company, with whom they have entered into a provisional agreement.

The New Gas Offices at Gloucester.—The Gloucester Gas Company, after 70 years' tenancy of offices at the Quay, are now removing to handsome and commodious premises at the corner of Eastgate and Clarence Street. The works were removed to Hempsted in 1879. The new offices, which have cost upwards of £5000, have been specially designed by Mr. Walter B. Wood, of Queen Street, Gloucester. The building is entirely of brick, with stone dressings faced with Wilderness brick. A central corridor, with entrance vestibule, is very imposing. On the left and right are the general office and show-rooms; each being 20 ft. by 30 ft. Other rooms of smaller dimensions are devoted to the Secretary's office, the Engineer's office, and the collectors' and time-keeper's room. On the first floor are large rooms for the use of the Board, &c. Another room, 20 ft. by 30 ft., is to be occupied by the Gloucestershire School of Cookery, who will give preference to gas-stoves. At one corner are the caretaker's apartments; while, in the basement, consideration has been given for storeage cellars, with lamplighters' and testing rooms. At the rear of the building there are workshops for fitters, and also a smithy. Most of the rooms are heated by Messrs. T. Fletcher and Co.'s stoves; and a few by those of Mr. C. Wilson, of Leeds. The show-room, which has a wood block flooring on concrete, will contain a large assortment of heating and cooking appliances; and everything will be done to attract the gas consumers of the city. The Secretary (Mr. W. E. Vinson) and the Directors are to be complimented on their new building, which does credit to the gas industry. The offices will be formally opened during the present month.

The Leeds Corporation Gas Committee and Stoking Machinery.—According to the *Yorkshire Post*, a section of the Gas Committee of the Leeds Corporation is at present engaged in making inquiries as to the desirability or otherwise of experimentally trying stoking machinery at one or more of their gas-works. The Sub-Committee, which was deputed a few weeks ago to visit several large gas-works at which machinery has been adopted, first went to East Greenwich and Beckton. Both at East Greenwich and Beckton the apparatus had been stopped for repairs when the deputation arrived. Efforts were made at each place to work it, but a breakdown is said to have been the result in both instances. They found the machinery reduces the number of hands required by one-third; but they seem to think that the apparatus they saw did not work so well as might be wished—the necessary repairs being frequent and costly. The deputation appears to have returned home believing, almost unanimously, that, unless some better method of machine-stoking than that in operation at East Greenwich can be found, Leeds had better stick to manual stoking. The Committee have not presented their report yet, having determined not to do so until Manchester and Blackburn have been visited. Glasgow, in the opinion of the deputation, possesses the most approved drawing machinery yet invented, and they may possibly go to see it; but that city has not adopted machine-stoking in its entirety. Our contemporary understands that, if the Committee decide to make a trial of stoking machinery, this can only be done at the New Wortley works, as the system could not be introduced at the York Street and Meadow Lane establishments without expensive structural alterations being first carried out. With the object of thoroughly acquainting themselves with the practical aspects of the subject under notice, the Gas Committee recently gave permission to Messrs. Yeadon and Co. to make experiments in machine-stoking at the disused gasholder station in the neighbourhood of Willow Street.

The South Essex Water Company and the Grays Sewerage Scheme.—A short time ago an inquiry was held by Mr. J. T. Harrison, C.E., on behalf of the Local Government Board, in reference to an application made to them by the Local Board of Grays, in Essex, to borrow £30,000, in order to carry out a scheme of sewerage and sewage disposal for the town. The Engineer for the scheme is Mr. W. H. Radford, C.E., of Nottingham, whose plans were selected as the result of a public competition. Mr. Radford had prepared alternative schemes for the disposal of the sewage; but the sewerage arrangements in the town were the same for both. The Local Government Board were first asked to approve a scheme for delivering all the sewage of the town to one point by gravitation; it being proposed to then pump it a lift of 97 feet to Lodge Farm, where it was to be purified by irrigation on 93 acres of land. This application was opposed by the South Essex Water Company and various Local Authorities who use the Company's water. It was said that the supply would be polluted through the effluent penetrating through the chalk strata into the Company's well, situated about a mile from the farm. The Company were entitled to drive headings in the chalk to within 440 yards of the farm, where the chalk strata were covered by Thanet sand, varying from 8 to 35 feet in thickness. The Local Board's Engineer contended that as the large fissures in the chalk invariably ran from north-west to south-east, and the farm was situate to the north-east of the Company's well, none of the effluent would get into their supply. Opposition to the scheme was also made by the owners of a brewery, who believed their water also might be contaminated. Eventually the Grays Local Board presented a resolution, asking the Local Government Board, if they decided to refuse the irrigation scheme, to approve the alternative scheme for the disposal of the sewage by means of precipitation tanks to be erected near the Thames; the loan being reduced to £26,000. The Inspector therefore considered and received evidence with respect to the "tank" scheme. The population of the town is 12,000; but it was proposed to provide for 30,000. A very large set of plans and details were produced, and Mr. Radford explained them fully to the Inspector. There was very little opposition; and the scheme will probably be approved by the Local Government Board.

Electric Lighting at Carlow.—Messrs. J. E. H. Gordon and Co., have just finished an electric installation for the public and private lighting of Carlow by means of water situated at Milford, five miles distant. The electricity is brought into the town by overhead wires; and it is distributed through 4¾ miles of the streets. The contract for the supply of electricity commenced with the new quarter; and the works were started at midnight on the 24th ult

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 62.)

Issue.	Share	When ex-Dividend.	Dividend last paid.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	10 Apl.	10½	Alliance & Dublin 10 p. c.	10	17—18	+½	5 16 8
100,000	10	,,	7½	Do. 7 p.c	10	11½—12½	..	6 0 0
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	104–106[2]	..	4 14 2
100,000	20	28 May	8	Bahia, Limited	20	15—17	..	9 8 3
200,000	5	13 May	7½	Bombay, Limited	5	6½—7	..	5 7 1
40,000	5	,,	7½	Do. New	4	4¾—5¼	..	5 14 1
380,000	Stck.	26 Feb.	12½	Brentford Consolidated	100	220—225	..	5 8 10
125,000	,,	,,	9½	Do. New	100	160—164	..	5 12 10
220,000	20	12 Mar	11½	Brighton & Hove Original	20	40—42	..	5 9 6
320,000	20	10 Apl.	11½	British.	20	43—45	..	5 0 0
50,000	10	12 Mar.	11	Bromley, Ordinary 10 p. c.	10	18—20	..	5 10 0
39,000	10	,,	8	Do. 7 p. c.	10	13—15	..	5 6 8
328,750	10	13 Nov.	6	Buenos Ayres (New) Limited	10	7⅞—8⅛	..	—
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	92—97[x]	..	6 3 9
150,000	20	26 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 6
550,000	Stck.	10 Apl.	13⅜	Commercial, Old Stock	100	255—265	..	5 3 9
130,000	,,	,,	10½	Do. New do.	100	195—205	..	5 4 10
130,000	,,	26 June	4½	Do. 4½ p. c. Deb. do.	100	119–121[x]	..	3 12 7
557,320	20	11 June	13	Continental Union, Limited	20	46—48	..	5 8 4
242,680	20	,,	13	Do. New '69 & '72	14	—	..	—
200,000	20	,,	10	Do. 7 p. c. Perf.	20	37—38	..	5 5 3
75,000	Stck.	25 Mar.	10	Crystal Palace District	100	200—205	..	4 17 7
486,090	10	28 Jan.	4†	European, Limited	10	20½—21½	..	—
354,660	10	,,	4†	Do. Partly paid	7½	15—16	..	—
5,470,630	Stck.	12 Feb.	13	Gaslight & Coke, A, Ordinary	100	238—243	..	5 7 0
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	96—99	..	4 0 9
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	255—260	..	3 16 11
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	120—125	..	4 0 0
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	175—180	..	4 3 4
1,300,000	,,	,,	7	Do. H, 7 p. c. max	100	160—164	..	4 5 4
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	253—258	..	3 17 6
476,000	,,	,,	—	Do. K, 6 p. c. Prf.	100	155—160	+1½	3 15 0
1,061,150	,,	11 June	4	Do. 4 p. c. Deb. Stk.	100	112–115	..	3 9 7
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	126–125	..	3 12 4
908,000	,,	,,	6	Do. 6 p. c. do	100	163–168	..	3 11 5
3,800,000	Stck.	13 May.	12	Imperial Continental	100	224–229	..	5 4 9
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	5	4½—5[x]	..	6 0 0
560,000	100	1 Apl.	5	Met. of Melbourne, 5 p. c. Deb.	100	111—113	..	4 8 6
541,920	20	11 June	6½	Monte Video, Limited	20	17½—18½	..	7 0 6
150,000	5	28 May	10	Oriental, Limited	5	8⅞—9	—⅛	5 11 1
60,000	5	25 Mar.	7	Ottoman, Limited	5	4½—5⅛	..	6 7 3
166,870	10	26 Feb.	2	Pará Limited.	10	3—4	..	—
				People's Gas of Chicago—				
420,000	100	4 May	6	1st Mtg. Bds.	100	92—97	..	6 3 9
500,000	100	1 June	16	2nd Do.	100	90—95	..	6 6 4
150,000	10	28 Apl.	10	San Paulo, Limited	10	15—16	..	6 5 0
500,000	Stck.	26 Feb	15½	South Metropolitan, A Stock	100	282—287	..	5 8 0
1,350,000	,,	,,	12	Do. B do.	100	241—245	+1	4 17 11
166,500	,,	,,	13	Do. C do.	100	242—250	..	5 4 0
678,000	,,	26 June	5	Do. 5 p. c. Deb. Stk.	100	139–143[x]	..	3 10 0
60,000	5	12 Mar.	11½	Tottenham & Edm'nton, Orig.	5	11—13	..	4 8 5
				WATER COMPANIES.				
729,281	Stck.	26 June	10	Chelsea, Ordinary	100	260–270[x]	..	3 14 1
1,720,560	Stck.	10 Apl.	8	East London, Ordinary	100	212—217	..	3 13 9
544,440	,,	26 June	4½	Do. 4½ p. c. Deb. Stk.	100	138–143[x]	..	3 3 0
700,000	50	11 June	8	Grand Junction	50	107—111	..	3 12 0
708,000	Stck.	12 Feb.	10½	Kent	100	265—270	..	3 17 10
1,043,800	100	26 June	9½	Lambeth, 10 p. c. max.	100	256–241[x]	+1	3 18 8
406,200	100	,,	7½	Do. 7½ p. c. max.	100	192–197[x]	..	3 16 2
260,000	Stck.	25 Mar.	4	Do. 4 p. c. Deb. Stk.	100	118—123	..	3 5 0
500,000	100	12 Feb.	12½	New River, New Shares	100	347—352	..	3 8 10
1,000,000	Stck.	28 Jan.	4	Do. 4 p. c. Deb. Stk	100	125—128	..	3 2 6
902,300	Stck.	11 June	6½	S'thwk & V'xhall, 10 p. c. max.	100	167–171	..	3 16 0
126,500	100	,,	6½	Do. 7½ p. c. do.	100	160–165	..	3 18 9
1,155,066	Stck.	11 June	10	West Middlesex.	100	250–260	..	3 16 11

[x] ex div.

† Interim dividend.

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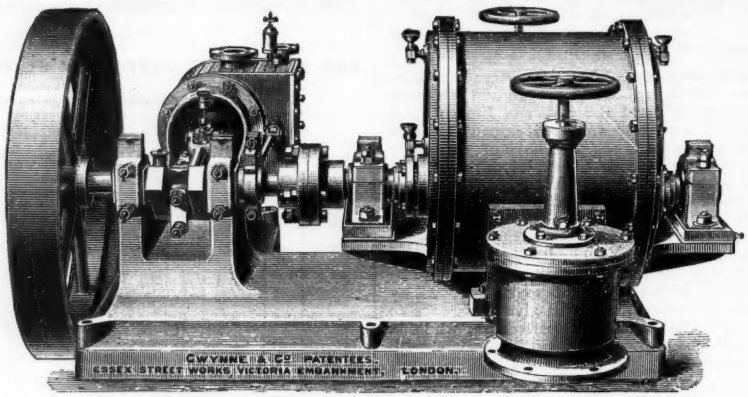

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Head Office: MIDDLESBROUGH. Correspondence invited.

MR. ALFRED KITT, Consulting Engineer, 5, VICTORIA STREET, WESTMINSTER, late Engineer of the Pimlico and Westminster Stations of The Gaslight and Coke Company.

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DURING the illness of Mr. Neill Meiklejohn, Sole Patentee and Manufacturer of the above, all communications should be addressed to C. MEIKLEJOHN, Gas Engineer, OLDBURY.

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THE CHEMISTRY OF ILLUMINATING GAS.

By NORTON H. HUMPHRYS, Assoc. M. Inst. C.E., F.C.S.

The matter composing this book consists mainly of articles written for, and published in, the JOURNAL. The preface says: "In view of new processes that seem to fall in thick and fast one on the other, it has been several times suggested that they should be collected together, so as to form a record of the various gas-making processes that have been proposed in the past, together with some account of the natural laws that govern the manufacture and supply of Illuminating Gas."

The work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation Condensation; and Purification.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

WORKING Foreman Wanted, for a small Tar and Sulphate Works in the Provinces. Wages 30s., with Cottage on the Works.
Apply, by letter, to No. 1973, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, a practical Working GAS MANAGER for about Six weeks. One with good experience, and who can set retorts, &c., preferred.
Apply, in first instance, to No. 1974, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a steady Working Man (married preferred), single handed, to take charge of small Gas-Works. Wages 24s. per week, with House, Fuel, and Gas.
Apply, by letter, with testimonials to the SECRETARY, Gas Company, Seaford, SUSSEX.

TO GASHOLDER MAKERS.

THE Directors of the Fenny Stratford Gas Company are prepared to receive TENDERS for a GASHOLDER, 48 feet diameter, to be erected at their Works at Fenny Stratford.
Plans and specifications may be seen at the Office of the Gas Company, at Fenny Stratford; or at the Office of Mr. John Eunson, C.E., Northampton, on and after Thursday, the 16th inst.
Tenders, addressed to the Chairman, to be delivered to the Secretary of the Gas Company on or before Saturday, the 25th inst.
The Directors do not bind themselves to accept the lowest or any tender.

T. U. GREEN,
Secretary.

Fenny Stratford,
July 13, 1891.

LINCOLN CORPORATION.
(GAS DEPARTMENT.)

TENDERS FOR TAR AND AMMONIACAL LIQUOR.

THE Gas Committee of the Corporation of Lincoln are prepared to receive TENDERS for the purchase of the surplus TAR, and of the whole of the AMMONIACAL LIQUOR produced at their Works, during the period of One year, commencing on the 1st of July, 1891.
Sealed tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Residuals," must be delivered at the Gas Offices, Newland, on or before the 24th inst.
The Committee do not bind themselves to accept the highest or any tender.
Information as to quantities and other particulars may be obtained of the undersigned.

JNO. CARTER,
Manager.

Gas-Works, Lincoln,
July 4, 1891.

LINCOLN CORPORATION.
(GAS DEPARTMENT.)

THE Gas Committee of the Lincoln Corporation invite TENDERS for the supply of 16,000 tons of screened GAS COAL, COBBLES, and NUTS, to be delivered during a period commencing the 1st of August, 1891, and terminating the 30th of June, 1892.
Further particulars and forms of tender may be obtained from the undersigned.
Sealed and endorsed tenders, addressed to the Chairman of the Gas Committee, must be delivered on or before the 24th inst.
The Committee do not bind themselves to accept the lowest or any tender.

JNO. CARTER,
Manager.

Gas Offices, Lincoln,
July 4, 1891.

TIPTON GAS-WORKS.

COAL CONTRACTS.

THE Gas Committee of the Tipton Local Board invite TENDERS for the supply of GAS COAL for a period of One, Two, or Three years, from the 1st of July inst., in annual quantities of about 9000 tons, to be delivered carriage free to the Gas-Works Siding (L. & N.W.R.)
Specification and form of tender may be obtained at the Gas-Works on application to Mr. Vincent Hughes, the Engineer and Manager.
Sealed and endorsed tenders to be sent to me, the undersigned, not later than Ten a.m. on Friday, the 24th inst.
The Committee do not bind themselves to accept the lowest or any tender.

By order,
GEO. M. WARING,
Clerk to the Board.

Public Offices, Tipton,
July 3, 1891.

TIPTON GAS-WORKS.

TAR CONTRACT.

THE Gas Committee of the Tipton Local Board invite TENDERS for the purchase of the surplus TAR produced at the above Works, during a period of One, Two, or Three years, from the 1st of July inst.
Particulars may be obtained at the Gas-Works, on application to Mr. Vincent Hughes, Engineer and Manager.
The Tar may be delivered either into boats or on rail (L. & N.W.R.) as may be required.
Sealed and endorsed tenders to be sent to me, the undersigned, not later than Ten a.m. on Friday, the 24th inst.
The Committee do not bind themselves to accept the highest or any tender.

By order,
GEO. M. WARING,
Clerk to the Board.

Public Offices, Tipton,
July 3, 1891.

STRATFORD-UPON-AVON CORPORATION.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of 3000 tons of good quality GAS COAL or NUTS.
Forms of tender and full particulars can be obtained upon application to

J. S. CRANMER,
Manager.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Kingston-on-Thames Gas Company are prepared to receive TENDERS for the surplus TAR produced at their Works for Twelve months from the 1st day of August, 1891, to the 30th day of July, 1892.
Price to be quoted at per gallon f.o.b., at their Wharf, Kingston-on-Thames.
Further particulars may be obtained on application to Mr. H. P. Packham, Engineer.
Sealed tenders to be sent in addressed to the Chairman not later than Wednesday, the 22nd inst.

By order,
J. A. FRICKER, Secretary.

TENDERS FOR TAR.

THE Directors of the Exeter Gaslight and Coke Company invite TENDERS for their surplus TAR for One year from the 14th day of October next.
Delivery on Company's Works, filled into Purchaser's tanks.
Payments, cash monthly.
Sealed tenders, endorsed "Tender for Tar," will be received by the undersigned on or before Tuesday, the 4th day of August next; but the Directors do not bind themselves to accept the highest or any tender.

By order,
W. A. PADFIELD,
Secretary and Manager.

Gas Offices, High Street, Exeter,
July 9, 1891.

CORPORATION OF CARNARVON.

THE Gas Committee of the above Corporation invite TENDERS for the supply of about 1700 tons of COAL, and 150 tons of CANNEL per annum, for One, Two, or Three years.
Deliveries free at Carnarvon Station.
Sealed tenders, endorsed "Tender for Coal," and addressed to the Chairman of the Gas Committee, Gas Office, Carnarvon, to be delivered not later than the 25th of July, prox.
The Gas Committee do not bind themselves to accept the lowest or any other tender.
Further particulars on application to

MAT. J. PARSONS,
Engineer and Manager.

Gas Office, Guild Hall.
Carnarvon, July 8, 1891.

BOROUGH OF DARWEN.

SUPPLY OF COAL AND CANNEL.

THE Corporation are prepared to receive TENDERS for the supply of about 8000 tons of best screened GAS COAL, and 3500 tons of CANNEL, to be delivered at the Gas-Works Siding, Darwen, in the Corporation Wagons, before June, 1892.
Further information, particulars of deliveries, and forms of tender may be obtained from Mr. Thomas Duxbury, Gas Engineer, Darwen.
Sealed tenders, endorsed Tender for "Coal" or "Cannel," must be delivered to the undersigned at or before noon on Monday, the 27th of July.
No tender necessarily accepted.

By order,
CHAS. COSTEKER,
Town Clerk.

Town Clerk's Office, Darwen,
July 7, 1891.

TO BUILDERS AND CONTRACTORS.

THE Sheffield United Gaslight Company invite TENDERS for constructing an INNER LINING to the existing GASHOLDER TANK, 155 feet diameter by 30 feet deep, at their Grimesthorpe Station. The Lining will consist of a Brick, Stone, and Asphalte Wall and Bottom.
The Asphalte will be executed under a separate Contract.
Drawings and specifications may be seen, and form of tender with bill of quantities obtained, on application to Mr. Fletcher W. Stevenson, the Company's Engineer, on payment of One Guinea (which will be returned on receipt of a *bond fide* tender).
The Directors do not bind themselves to accept the lowest or any tender.
Sealed tenders must be delivered, addressed to the undersigned, on or before Monday, the 27th day of July next.

HANBURY THOMAS,
General Manager.

Commercial Street, Sheffield,
June 17, 1891.

BY ORDER OF THE EXECUTORS OF W. F. LONDON, ESQ., DECEASED; THE TRUSTEES OF DR. RONALD, DECEASED; EXECUTORS OF W. G. KENT, ESQ., DECEASED, AND OTHERS.

Gas and other Shares and Stock in the following Companies:—
The Gaslight and Coke Company, £945 stock.
Commercial Gas Company, £782 5s. stock.
Crystal Palace Gas Company, 130 shares.
Colney Hatch Gas Company, 33 shares.
Brentford Gas Company, £700 stock.
Ascot District Gas Company, 25 shares.
Albo Carbon Light Company, 47 shares.

MR. ALFRED RICHARDS will sell the above BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Friday, July 17, 1891, at One o'clock precisely, in lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

COAL CONTRACT.

THE Pembroke Dock and Town Gas Company, Limited, are prepared to receive TENDERS for the supply of from 500 to 1800 tons of GAS COAL during the Twelve months ending June 30, 1892.
Tenders to be sent in by Monday, July 20 next, addressed to the MANAGER, Gas-Works, PEMBROKE DOCK, from whom full particulars may be obtained.
The lowest or any tender not necessarily accepted.
Pembroke Dock Gas-Works,
June 29, 1891.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.
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For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, 22, Alwyne Road, Canonbury, LONDON, N.

Prices are Reduced.

HEBBURN MAIN GAS COALS.

Produce of Gas per ton	10,500 feet.
,, Coke ,,	13½ cwt.
Illuminating Power	16 candles.

For Prices, f. o. b. Ship or delivered, apply to
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Hebburn Colliery Offices, NEWCASTLE-on-TYNE.

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MANUFACTURER OF SULPHURIC ACID
OF EXTRA QUALITY FOR MAKING
WHITE SULPHATE OF AMMONIA.

TAR, LIQUOR, AND SPENT OXIDE
Purchased for Cash against Delivery.

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(Established 1820)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
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SOUTHWARK, LONDON, S.E.
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

THE SILICA FIRE-BRICK COMPANY,
OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS, BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.
Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

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FIRE-CLAY & BRICK WORKS,

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Prices and Analysis of all the Scotch Cannels on application.

NEWBATTLE CANNEL.

QUOTATIONS ON APPLICATION TO

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LANEMARK CANNEL AND GAS COALS.

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(Wrought out of Holmside and South Moor Collieries.)

PRESENT production nearly 3000 tons per working day. Area of coal about 5000 acres, including the largest remaining workable proportion of pure HUTTON SEAM GAS COAL. Analysis of HOLMSIDE GAS COAL *in bulk as shipped* gives 10,500 cubic feet of Gas per ton, of an Illuminating Power of 16¼ candles. The Sulphur is about 1 per cent., and the Ash 1¾ per cent. The Coal cokes well, and leaves 69 per cent. of excellent Coke. During the year 1890, the London Gas Companies carbonized about 400,000 tons of HOLMSIDE COALS. They are used by The Gaslight and Coke Company, the South Metropolitan Gas Company, the Woolwich (Government) Gas-Works, the Newcastle and Gateshead Gas Company, the European Gas Company, L'Union des Gaz, and by many other Gas Companies both at Home and Abroad.

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SOOTHILL WOOD CANNEL.

Yield of Gas per Ton, over 12,000 Cubic Feet.
Illuminating Power - - - - - 26 Candles.
Coke per Ton, - - - - - - - 57 per cent. of a quality almost equal to that made from the best Coking Coal.

For Analysis and Price, apply to

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SOOTHILL WOOD COLLIERY,

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Manufacturers of the **"Thomas"** Patent Lamps for general lighting, also for Public Buildings, Institutions, &c., and for outside purposes.

The best Regenerative Lamp in the Market.

Special quotations to Gas Companies.

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JAMES WHITE & Co., Limited,

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Sole Proprietors of the Largest and Purest Beds of Fire-Clay in England.

FOR GAS FURNACES our GANNISTER and SILICA FIRE-BRICKS are acknowledged to be the best and most durable in the market.

GANNISTER and SILICA FIRE-CLAY guaranteed of the Purest and Finest Quality.

ANALYSIS AND REFERENCES ON APPLICATION.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

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YOUNG, DANCE, & CO.,

COAL OWNERS, NEWCASTLE-ON-TYNE,

Or E. FOSTER & CO., 21, John St., Adelphi, LONDON, W.C.

G. WALLER & CO.'S "PHŒNIX WASHER"

The Divisions in the Revolving Discs are filled with

"WOODEN CLUSTERS"

(As patented by them in 1883).

They are also fitted with tubes for distributing Liquor over the Clusters.

Efficient in action and small driving power.

Patent four-blade exhausters to pass from 50,000 to 500,000 feet per hour.

Patent three-blade exhausters to pass from 5000 to 40,000 feet per hour.

EXISTING EXHAUSTERS ALTERED TO PASS AN INCREASE OF 30 TO 50 PER CENT.

Using the same Valves, Connections, and Driving Power.

FRICTION 25 PER CENT. LESS THAN OTHER EXHAUSTERS.

THE DELIVERY OF GAS BEING MORE DIVIDED EACH REVOLUTION, THE GAUGE IS MORE STEADY.

Model of Four or Three Blade Exhauster on application.

MAKERS OF BEALE EXHAUSTERS FOR 300 WORKS.

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ALFRETON IRON-WORKS, DERBYSHIRE,

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Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter; and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

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FOR GAS AND WATER.

Pipes, One to Six inch Bore, kept in Stock. Also a very large assortment of all sizes of Bends, T-pieces, and Specials ready for despatch on receipt of Order.

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FOR GAS, WATER, AND STEAM

TELEGRAMS: "PIPES GLASGOW."

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UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

MIRFIELD, NORMANTON.

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AND SONS, LIMITED,

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STEEL OF ALL DESCRIPTIONS.

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ANALYSIS AND PRICES ON APPLICATION.

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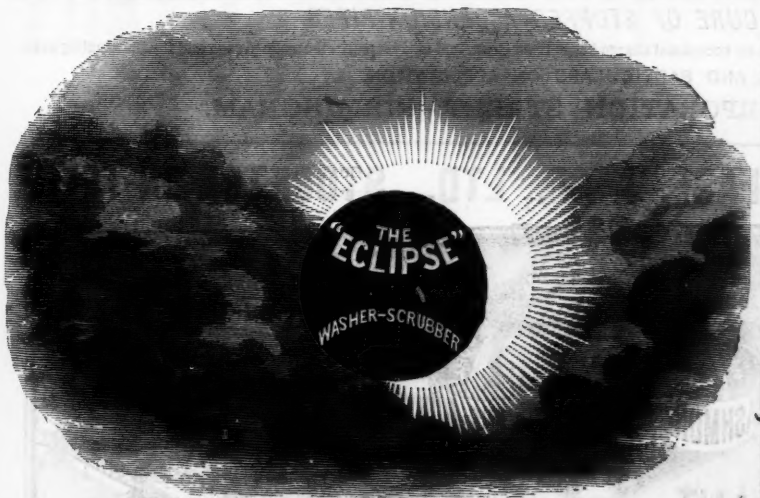

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The most efficient Machine known for extracting Ammonia and other Impurities from Coal Gas.

MACHINES with a total capacity of **42,500,000** cubic feet now working, and give great satisfaction.

LAST YEAR 11 Machines erected with a total capacity of **20,000,000** *feet.*

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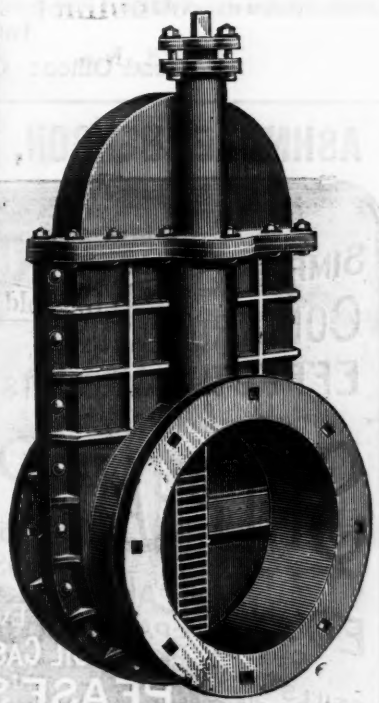
SILVER MEDAL, Inventions Exhibition, 1885.



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NEW HIGH-POWER GAS-LAMP.

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Gas Companies should hire these Lamps to their Consumers, and introduce them for Street Lighting as a rival to the Electric Light, as they do not get out of order, are most economical, and the Burner being a circular slit does not choke up.

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PRICES ON APPLICATION.

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Illustrated Pamphlet and Terms on application to J. E. FISHER, Stourbridge, Agent for England and Wales; to C. M. HAMILTON, Portland Place, Hamilton, Agent for Scotland and Ireland; and for all other Countries to the Patentee,

Geo. R. HISLOP, Gas Engineer, PAISLEY, N.B.

G. J. EVESON,

GAS COAL AND CANNEL CONTRACTOR,

PATENTEE OF

A SPECIAL COMPOUND

FOR THE CURE OF STOPPED ASCENSION-PIPES,

A couple of charges of which will clear a stopped pipe, and an occasional charge keeps them clean, and also increases the make per ton and the illuminating power.

PRICE AND PARTICULARS ON APPLICATION.

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SIMPLE IN CONSTRUCTION
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ECONOMICAL IN COST & SPACE
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ALDWARKE MAIN GAS COAL

Analysis: 12,600 feet of 19-candle gas per ton.

Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.

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FOR ANY PURPOSE.

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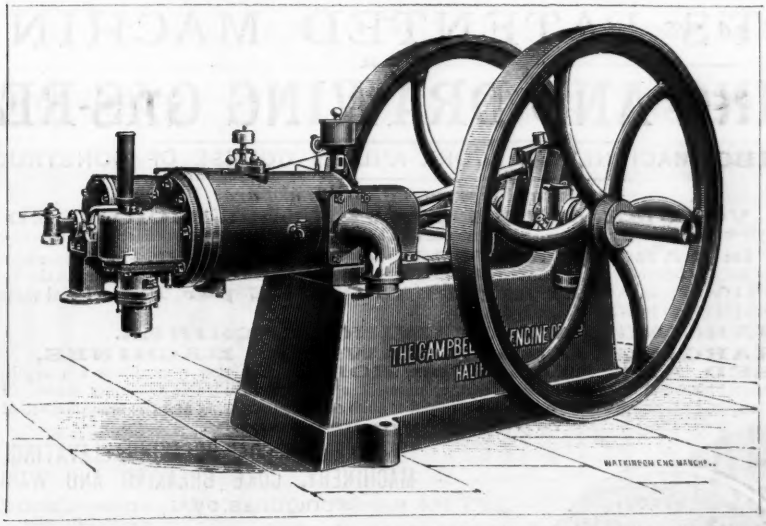

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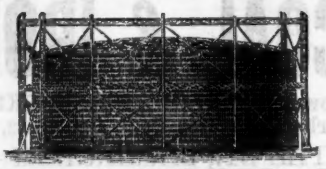

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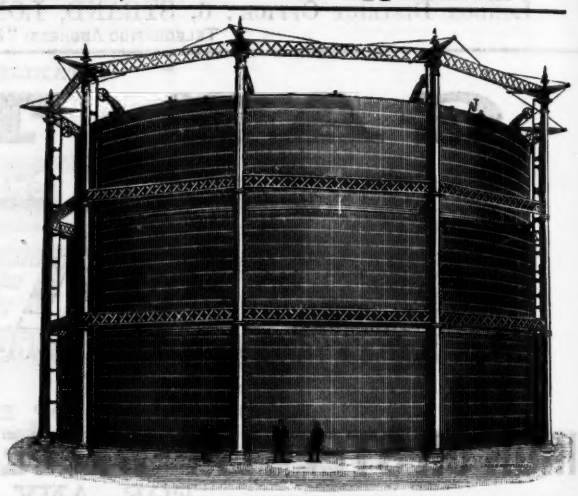

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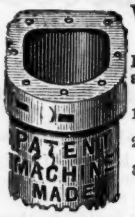

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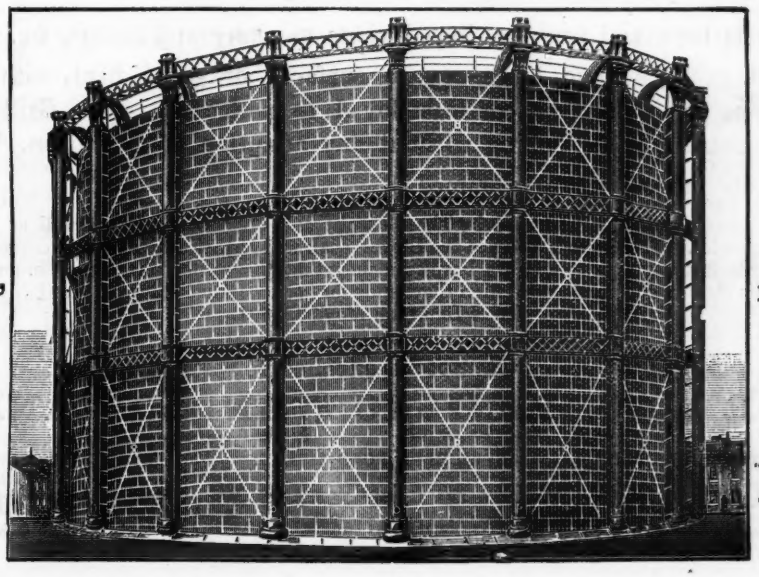

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[See also Advt., p. 58.

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